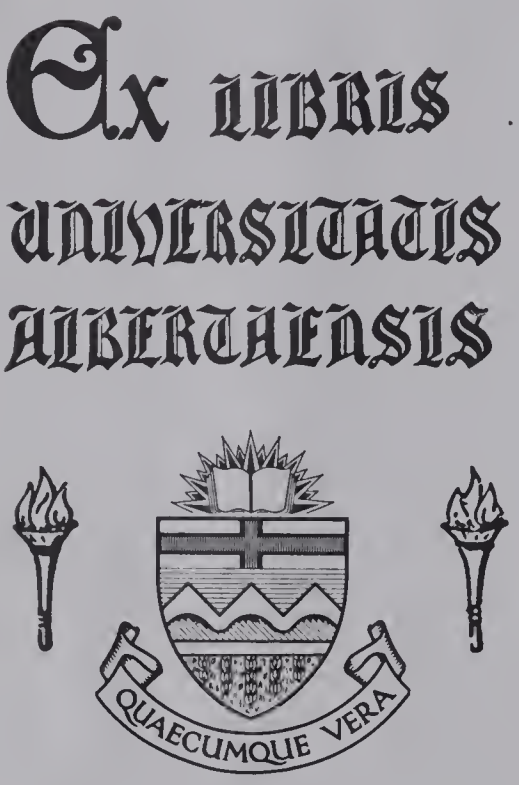
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THE UNIVERSITY OF ALBERTA

RECREATIONAL CAPABILITY AND USE OF SOME NORTH-CENTRAL ALBERTA LAKES

by

© JULIAN JOSEPH NOWICKI

A THESIS

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The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies for acceptance, a thesis entitled "Recreational Capability and Use of Some North-Central Alberta Lakes," submitted by Julian Joseph Nowicki, in partial fulfilment of the requirements for the degree of Master of Arts.

ABSTRACT

In north-central Alberta between Lac La Biche and Cold Lake is found a region characterized by many lakes. There exists little research into the recreational capability and use of these lakes. This study attempts to alleviate some of this shortage of research by looking at the prevailing summer recreational situation in this lakes region, i.e., recreational capability, recreational land use, and user preferences.

This study is limited to the lakes and their shorelands. A discussion of the physical geography of the region in which the lakes are found is considered first. The physiography, soils, vegetation, and climate are pertinently highlighted. Climate is dealt with at some length from the standpoint of the physiological and psychological comfort of the recreationist. There follows a detailed physical description of the lakes, as a means of establishing their recreational capability. A modified version of the Canada Land Inventory land capability classification for outdoor recreation is used to establish the recreational shoreland capability of approximately half of the lakes in the study area. The modification suggested and applied enables the mapping of the shorelands to be done in greater detail. This tends to make the classification of more value for future planning in the area. Present recreational land use is examined under the broad headings of government administered recreational areas and private recreational areas. The opinions of a sample survey

of campsite, summer resort, and cottage users are analyzed. Campsite and summer resort users were interviewed personally and cottagers were mailed questionnaires. The two user studies investigated: (1) user hinterlands, (2) socio-economic characteristics, (3) travel habits, (4) recreational activities (5) accommodation used, (7) facilities, i.e., campsites and cottage, (8) expenditures, (9) location and site selection for the cottage.

This study concludes that the recreational capability of the lakes is high. Climatically, the region offers a physiolcgically comfortable environment during the summer but has a severe winter. The user studies indicate that there should be from time to time, re-evaluation of some portions of the CLI classification system. There also appears to be a lack of coincidence between the portions of lakes with a high recreational capability, and optimum recreational land use around these lakes. Recreational land use mismanagement is evident and there is an urgent need for a regional planning and development approach for not only the recreational resources but for the total resources of this lakes region.

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"I think that there is far too much work done in the world, that immense harm is caused by the belief that work is virtuous, and that what needs to be preached in modern industrial countires is quite different from what always has been preached." (Bertrand Russell)[1]

---

[1] Bertrand Russell, "In Praise of Idleness," A Book of Essays, edited by Robert Chambers and Carlyle King. The MacMillan Company of Canada Limited, Toronto, 1963, p. 99.

INTRODUCTION

This thesis deals with the natural outdoor recreational capability and recreational use of some north-central Alberta lakes. Before proceeding to an examination of recent approaches in recreation geography it would seem appropriate, especially in the light of Bertrand Russell's quotation, to introduce some of the philosophical definitions of leisure, recreation, and outdoor recreation. This will allow one to see if geographers have the same interpretation of recreation as people in other disciplines.

Outdoor recreation, that part of recreation that involves the use of the natural environment, consumes only a small part of leisure time. Not only are terms like leisure, recreation, and outdoor recreation occasionally used synonymously but their definition is usually very philosophical and varies for each individual. To illustrate, let us look at some of the interpretations of: (1) leisure, (2) recreation, (3) outdoor recreation.

Nash states that leisure is not synonymous with recreation. He goes on to add that

> leisure refers to all the time left over after the survival activities -- eating, sleeping, wage work, and other necessities -- have been attended to. But this leftover time is not necessarily recreation. The use of leisure

> may vary all the way from delinquent acts to the end results of the creative artist.[1]

He goes on to base his definition of recreation on creativity and purposeful acts. He says:

> As work becomes mechanized and routinized and ceases to be an outlet for creativity, recreation is those activities which form an outlet to creativity, both in a physical and a spiritual sense.
>
> This definition limits the recreation use of leisure time to purposeful acts. Recreation constitutes only a small part of leisure; but as needs can be established, it should become more and more the major part.[2]

Other definitions of recreation are these of Mitchell, Farina, Brockman, Hutchinson, and others. Mitchell defines recreation as ". . . the display of an experience or experiences that contributes to a significant change from the normal day to day routine of men, women, and children."[3] Farina in a recent paper maintains that recreation is a ". . . voluntary activity indulged in without external compulsion, which results in the revitalization

---

[1] Jay B. Nash "The Enlarging Role of Voluntary Leisure-Time Associations In Outdoor Recreation And Education," Trends In American Living and Outdoor Recreation, Outdoor Recreation Resources Review Commission Study Report 22. U.S. Government Printing Office, Washington, D.C., 1962, p. 158.

[2] Ibid., p. 158.

[3] Lisle L. Mitchell, An Empirical Study of Urban Recreation Units: Playgrounds As Central Places. Ph.D. thesis, Ohio State University, 1967, p. 1.

(or recreation) of body or mind."[4] On the other hand, Brockman defines recreation as ". . . 'the pleasurable and constructive use of leisure time.'"[5] Hutchinson introduces the idea of a socially accepted leisure experience. He defines recreation as ". . . 'a worthwhile, socially accepted leisure experience that provides immediate and inherent satisfaction to the individual who voluntarily participates in an activity."[6] The Canada Land Inventory (henceforth referred to as CLI) land capability classification for outdoor recreation views recreation as those activities in which individuals voluntarily engage during leisure time, the motivation being personal satisfaction or pleasure derived before, during and after participation.[7]

Though the above definitions differ significantly from each other they do stress that the use of leisure time defined as recreation, must be voluntary, creative both physically and spiritually, pleasurable, and constructive. One may certainly question some of the above common themes. For example, what happens in the case of the individual whose wife and children exert

---

[4]J. Farina, "The Social and Cultural Aspects of Recreation," Resources for Tomorrow Conference. Montreal, Canada, 1967, p. 944.

[5]Christian F. Brockman, Recreational Use of Wild Lands. McGraw-Hill, New York, 1959, p. 1.

[6]J. L. Hutchinson quoted in Raleigh Barlowe, "Land for Recreation," Land Use Policy and Problems in the United States, edited by Howard W. Ottoson. University of Nebraska Press, Lincoln, 1963, p. 257.

[7]Canada Land Inventory, Agricultural Rehabilitation and Development Act and Rural Development, Field Manual: Land Capability Classification for Outdoor Recreation, June, 1967, pp. 5, 6.

"external" if subtle pressure on him when he himself may not on such occasions desire "voluntarily" to participate in an activity. This certainly may be stretching the point of voluntary participation but it does serve to illustrate the difficulty of trying to arrive at an exacting definition of recreation. Furthermore, perhaps Hutchinson's idea of a socially accepted leisure experience should be introduced into all the definitions. For example, some people seem to derive much "personal satisfaction or pleasure" from vandalism but is this to be regarded as a recreational activity? To offer another definition here would but confuse the situation further. However, the writer feels that the CLI definition is one of the better definitions of recreation offered so far. Thus, the CLI definition has been adopted for use in this thesis with of course some of the above reservations about it.

Outdoor recreation to various authors is simply recreation, however, defined, and involves the use of the natural environment. For example, Carlson states that "outdoor recreation comprises all forms of recreation that involve the use, understanding, or enjoyment of the natural environment."[8] Much along Carlson's idea is the CLI definition which stipulates that recreation as defined above occurs in a natural environment as opposed to a man-made one, with the exception of course, of man-made features such as

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[8]Reynold E. Carlson, "A Research Program in Outdoor Recreation Activities," National Conference on Outdoor Recreation Research. Ann Arbor Publishers, Ann Arbor, Michigan, May, 1963, p. 82.

reservoirs, and so on.[9] The writer is in agreement with this view of outdoor recreation involving the use of the natural environment and will follow the definition of outdoor recreation as proposed by the CLI.

Marion Clawson has put time perspective into the role of outdoor recreation with respect to the entire use of leisure time when he comments that as nearly as can be estimated, ". . . only about 3 or 4 per cent of all leisure time is used for outdoor recreation activity."[10]

Since this is a study in recreation geography it is useful to examine some of the current thinking of a few geographers concerning outdoor recreation in order to see how closely the approach of this thesis follows their views.

Speaking about the entire field of recreational research, Taylor finds that there are two very broad areas of interest: the first deals with the physical resources, and the second is concerned with the recreationists, or those people affected by the recreationists.[11]

Wolfe too has observed that

> the dominant approach among geographers working in this field [outdoor recreation] is that of the study of natural

---

[9]Canada Land Inventory, op. cit., p. 6.

[10]Marion Clawson, Land and Water for Recreation: Opportunities, Problems and Policies. Rand McNally, Chicago, 1963, p. 7.

[11]Gordon D. Taylor, Recreation, Research and Geography. Paper presented to the Canadian Association of Geographers, Carleton University, May, 1967, p. 5.

> resources. In a word, most of these geographers, far from being 'everything-oriented,' are resource-oriented.[12]

Wolfe feels that for a geographer the most important element in the recreational pattern is the spatial aspect. He elaborates in a 1964 article:

> After all, the most important element in outdoor recreation is people, and one might think that everything else revolves around them, that increase in their numbers, their affluence, and their concentration in cities is the crucial element in the planning of future recreational facilities. But to proceed on this assumption is to overlook the aspect of outdoor recreation that is of more immediate concern to the geographer than to almost any other student of the problem--the spatial aspect.
>
> . . . . . .
>
> When space is taken into account, it becomes obvious that the operationally crucial factor is spatial imbalance, which involves movement of people from the places where they live to the places where the recreational facilities are.[13]

Trotter, also, in a recent article, writes:

> Despite current widespread concern for the need of outdoor recreation and recreational areas, geographers remain little involved in such work. At least this appears to be the case if publication is taken as a measure of involvement. Yet geographers could undoubtedly add to the knowledge of outdoor recreation

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[12]R. I. Wolfe, "The Geography of Outdoor Recreation: A Dynamic Approach," Geographical Perspectives: Some Northwest Viewpoints, B.C. Geographical Series, Number 8, Occasional Papers In Geography, edited by S. Tomkins. Tantalus Research Limited, Vancouver, Canada, 1967, p. 9.

[13]R. I. Wolfe, "Perspective on Outdoor Recreation: A Bibliographical Survey," Geographical Review, Vol. 54, No. 2, April, 1964, pp. 203-238.

> in at least three ways: (1) by expanding and increasing studies of specific recreation and resort areas and by systematic studies of particular aspects of recreation, (2) by improving and elaborating techniques of identifying and classifying existing and potential outdoor recreation areas, and (3) by studying travel patterns (routes and distances) and tributary areas of recreational facilities.[14]

Another geographer, Ullman, would go one step further than Trotter. He feels that since prediction is a characteristic of modern geography, then recreational demand studies too, would fall within the scope of a geographer's work.[15]

Perhaps as a final definition of the field of recreation geography, Mitchell's words may be quoted: ". . .recreational geography may be defined as the study of the spatial inter-relationships between recreational phenomena and man's total environment, natural and cultural."[16] Thus, the approach taken in this thesis of examining both the natural recreational resources and the recreational users, is certainly in agreement with current thinking in the field of recreation geography.

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[14]John E. Trotter, "Some Factors Influencing Attendance at Illinois State Parks," Journal of Geography, Vol. 64, No. 1, January, 1965, p. 23.

[15]Edward L. Ullman, "Geographical Prediction and Theory: The Measure of Recreation Benefits in the Meramec Basin," Lecture Over Forum Series, Voice of America, p. 6. The article has also been published as a chapter in: Saul B. Cohen, Problems and Trends in American Geography. Basic Books, New York, 1967, pp. 124-145.

[16]Mitchell, op. cit., p. 2.

The author too is of the opinion that recreational demand studies are certainly within the scope of recreation geography. A geographic study of the present recreational situation in a region, i.e., recreational resources, recreational land use, and recreational users, forms part of the basis for predicting future recreational demand. The necessity of knowing what the future demand will be is a very important factor for wise planning and conservation of resources. If a geographic study does not take into account recreational demand, then the impact of the study is diminished. However, sometimes, the magnitude of the study can be too large for the time or finances available, and it is not always possible to take into account either the demand, or perhaps one of the other aspects of the recreational situation (e.g., recreational land use) in the region. This unfortunately was the situation with this thesis study, where recreational demand was not considered. However, though this study is not totally complete, it is felt that much of the necessary information for making a recreational demand study for the region is supplied and thus this study does make a contribution.

The orientation of this thesis is toward the assessment of the present outdoor recreational capability and use of some north-central Alberta lakes. The study is limited to these lakes and their shorelands for three reasons: firstly, in this area the lakes are a major recreational resource; secondly, water is very important in outdoor recreational activities; and thirdly, time did not permit study of the surrounding upland encircling the lakes. A modified

version of the CLI land capability classification for outdoor recreation was used to establish the recreational shoreland capability of only approximately half of the lakes in the study area.[17] Aerial photographs were used initially to determine which lakes had capabilities that fall within the CLI shoreland designation. A total of 111 lakes met the criteria. A boat was used to rate the shorelands of 52 of the 111 lakes. Forty-eight lakes were surveyed by aircraft. The remaining eleven were explored on foot. When each of the lakes was surveyed, mapping was done at a scale of 1:50,000 and 1:63,360. Present recreational land use was mapped for these lakes also. Field work was carried out during the summer and fall of 1967.

Both a campsite and summer resort user study, and a cottage user study were done for all the lakes. Generally, the user studies were of summer use only, though cottagers were queried on use during the other seasons. From the addresses of the users, a campsite and summer resort user hinterland, and a cottage owner hinterland were established for the study area. Travel patterns were further examined under topics such as: main purpose of the trip, distances users are willing to travel, type of holiday, and so on. Next were examined various aspects of the recreational site(s) where the users went. Questions asked were: why the cottagers chose a particular lake for a cottage, lake shortcomings since location, why a particular cottage site was selected on the lake, site problems after cottage location, and so on. Recreational activities

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[17] Canada Land Inventory, op. cit., 125 pp.

participated in while at the recreational area were also learned, and in the campsite and summer resort study the users' opinions of the facilities at developed public and private campsites were requested. The campsite and summer resort users were further queried as to the type of accommodation they were using. Expenditures incurred by the users while on holiday were also explored.

The Land Committee of the United States National Resources Planning Board considers the assessment of land uses under five headings: (1) inherent characteristics, (2) present use, (3) use capabilities, (4) recommended use, (5) program effectuation.[18] Recreational land use is one of the land uses which requires assessment under all five headings used by the U. S. National Resources Planning Board and land use treatment in this study will be confined to it. The north-central Alberta lakes have been selected and examined along the lines suggested by the U. S. National Resources Planning Board. There will be a discussion of the physical geography of the region in which the lakes are found. The physiography, soils, vegetation, and climate of the total region will be pertinently highlighted. There then follows a detailed physical description of the lakes as a means of establishing their recreational capability. Present recreational land use on the lake shorelands will be briefly discussed. Then will follow an analysis of the opinions of a sample survey of campsite, summer resort, and cottage users. The thesis will conclude with a brief

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[18]Quoted in G. V. Jacks, Land Classification for Land-use Planning. Imperial Bureau of Soil Science, Harpenden, England, 1946, p. 10.

discussion concerning recommended recreational use and program effectuation. This latter aspect will involve a highlighting of some of the recreational problems in the study area and some suggestions for solving these problems. Some of the problems cannot be solved without further research and consequently there is a brief discussion of some of the needed research.

CHAPTER I

LAND CAPABILITY CLASSIFICATIONS FOR OUTDOOR RECREATION

Because of the numerous types of natural environment, recreational activities, and of the human tastes for choices in the enjoyment of one or more of these activities, there exists the need for assessment of environments in relation to both tastes and activity. Many authors have now begun to develop systems of classification of the natural environment for its recreational capability. A few of these will be discussed below.

Before discussing some of the European, American, and Canadian studies it will be useful to clarify some of the terminology concerning shorelands. Since this thesis is lake-orientated, the classification schemes discussed in the following pages will be limited to shorelands. Some of the studies cited define what the authors mean by terms used such as shoreland, dry beach, wet beach, offshore, shorezone, and so on. These include studies by Veatch and Humphrys, McCutcheon, and the CLI.[1] Other studies despite their obvious

---

[1] (1) J.O. Veatch, and C.R. Humphrys, Water and Water Use Terminology. Thomas Printing and Publishing Co., Ltd., Kaukauna, Wisconsin, 1966, 375 pp. (2) R.P.W. McCutcheon, Problems and Techniques of Recreational Capability Classification. Unpublished B.A. thesis, University of Western Ontario, London, 1966, 75 pp. (3) Canada Land Inventory, Agricultural Rehabilitation and Development Act and Rural Development, Field Manual: Land Capability Classification for Outdoor Recreation, June, 1967, 125 pp.

value, do not offer definitions. For example, in Hills' classification, one of the Canadian classification systems which will be discussed, shorelands are said to consist of five recognized zones: (1) dry beach, (2) wet beach, (3) outer littoral, (4) backshore, (5) backland. Hills defines wet beach as ". . . that portion of the shoreland from mean summer water level, outward to a water depth of five feet."[2] He does not define the remaining terms--at least not in the studies examined here. Booth too does not define any of his terms.[3] Thus, though one cannot be certain of the exact zonations intended by Hills and Booth, one may accept the beach profile (Figure 1) used by Veatch and Humphrys, and presented here in order to illustrate the zonation of these features as they are defined in a manual pertaining to water features espe-cially lakes and ponds.[4]

McCutcheon establishes his own definitions of zones along the shore-land quite differently from those of Veatch and Humphrys. This difference will become evident from the later discussion comparing McCutcheon's definitions

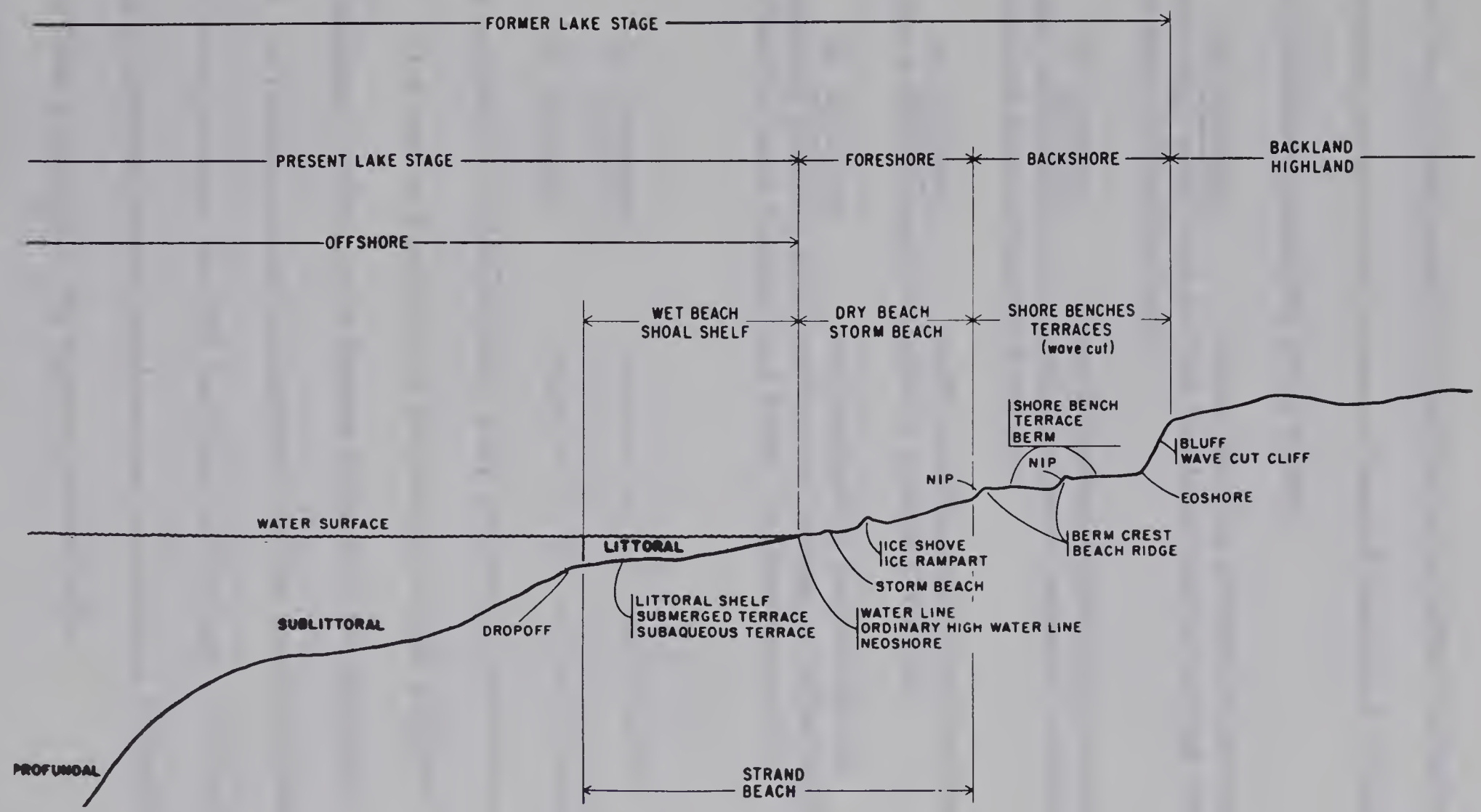
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[2]G.A. Hills, Brief Outline of the Hills' Approach to the Physiographic Classification and Ranking Systems Proposed for the Recreational Land Inventory, Report from Ontario Government, Department of Lands and Forests, Maple, Ontario, 1966, p. 1.

[3]Alfred W. Booth, The Lakes of the Northeastern Inland Empire: A Study of Recreational Sites, Bulletin No. 5. The State College of Washington, Bureau of Economics and Research, Pullman, Washington, April, 1948, 32 pp.

[4]Veatch, and Humphrys, op. cit., p. 26.

Figure 1 Diagram of Beach Profile



From: J. O. Veatch, and C. R. Humphrys, Water And Water Use Terminology. Thomas Printing and Publishing Co., Ltd., Kaukauna, Wisconsin, 1966, p.26.

with those of the CLI land capability classification for outdoor recreation, since the CLI zonations are very much the same as those of Veatch and Humphrys.

McCutcheon's shoreland components are as follows:

> (a) Foreshore: . . . area on the shore between the average annual high water level (or high tide level) and the average annual low water (or low tide) level.
>
> (b) Frontage: . . . zone extending landward from the foreshore, and reaching up to 1,000 feet (less if backed by a precipice) horizontal distance from the foreshore.
>
> (c) Offshore: . . . 'shelf' or continuation of the foreshore, which extends beneath the water to a depth of ten feet.
>
> (d) Backshore: . . . area landward of the frontage and extending generally 1,000 feet from the frontage, or to the height of the first major topographical break, whichever occurs first.
>
> . . . . . .
>
> (e) Shorezone: . . . consists of (a), (b), and (c) above.
>
> (f) Shoreland: . . . consists of (a), (b), (c), and (d) above.[5]

There is a contradiction in McCutcheon's study concerning the definition of frontage. In the text he stipulates that the frontage extends 1,000 feet landward from the foreshore, whereas, on a diagram illustrating his components of the shoreland, the frontage extends landward only 100 feet from the foreshore. In the following discussion the 1,000 foot figure will be used. In his criteria for a Class 1 shoreland site the backshore area can extend up to one mile inland. For Class 2 shorelands, the figure is one-half mile.

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[5] McCutcheon, op. cit., pp. 39,40.

Shoreland is defined as follows by the CLI.

> 'Shoreland' is a broad term embracing the various components of land fronting on a water body which is . . . capable of supporting recreation activity, ... In practice water bodies capable of supporting family boating are considered necessary for a shoreland (S) designation. Shoreland extends from the 5 foot depth contour at normal low water, inland from the shoreline to a natural boundary, or to a boundary which encompasses the direct zone of influence of the body water. In this inventory the zone of influence is assumed to reach a maximum of one mile in width in the case of a Class 1 unit . . . .[6]

The CLI shoreland components conform closely to those of Veatch and Humphrys. The definition of dry beach and beach is identical. Unlike Veatch and Humphrys, however, the CLI sets a definite limit to the wet beach. This limit is the five foot depth contour at normal low water. Backshore is defined on the same physical criteria as Veatch and Humphrys but in addition, the CLI takes into account the associated recreational development area necessary for the water body. As stated above this zone of influence of the water body can extend up to one mile landward from the five foot depth contour at normal low water.

McCutcheon and the CLI have a number of similarities in their definitions of the various components of the shoreland. Both similarily define shoreland as extending from the respective ten and five foot depth contour lines

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[6]Canada Land Inventory, op. cit., p.121

to the landward boundary of the backshore. The maximum landward extension of the shoreland boundary for a Class 1 unit is similar. McCutcheon sets a limit of one mile from the frontage. CLI stipulates one mile from the five foot depth contour line at normal low water. There, however, are many differences too. McCutcheon, for example, takes his offshore zone out to ten feet rather than the five feet of CLI. McCutcheon's definition of foreshore is between the average annual high water level and the average annual low water level. The CLI equivalent to the foreshore would be the dry beach which is the area normally subject to wash by high water, or storm waves. Unlike McCutcheon's definition the CLI dry beach extends landward from the normal summer high water rather than from the average annual low water level.

Canadian, American, and to a lesser extent European writers and agencies have been recently active in designing classifications of recreational capability. McCutcheon, in 1966 made the following observation concerning American and Canadian efforts:

> There have, in the past, been two major methods of rating landscape units for their recreational potential. Americans have, generally, rather loosely grouped areas according to their present recreational use, their ability to sustain high density recreation, and their nearness to or accessibility from high population centres. They have, apparently, ignored the suitability of the site or region for its particular use and the variety of pursuits it could potentially provide, and have concentrated on classifying according to some kind of management principle.
>
> Canadians, on the other hand, have tried, with varying degrees of success, to classify recreational potential on the basis of the physical quality of the site, and its ability to provide a wide variety of recreational pursuits. Inherent in this kind of classification

> is the assumption that the best quality and the widest variety will support the highest use density, and will, therefore, rate highest for recreation potential.[7]

This writer after researching quite thoroughly the subject of recreational landscape assessment is in agreement with McCutcheon's observation. For the purposes of this study, where the shoreland capability of the lakes is being established, a classification along Canadian lines is desirable. It is felt that only after a site's natural recreational capability is known that management factors such as accessibility should be taken into consideration. This writer feels that there is a normal procedure for planning, moving from a review of the capability of natural resources, through present use, and finally to the demand for these resources to ascertain whether or not they should be developed.

On the European scene Peiluck examined a recreation classification for Poland.[8] From it emerges the fact that the Polish approach is very much along Canadian lines described by McCutcheon.

> The basis for the system is the identification of the natural physical geographical divisions of the country with assumption that the areas of greatest recreation potential, and therefore,

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[7] McCutcheon, op. cit., p. 19.

[8] Institute of Geography, Polish Academy of Science, Tourist Regions of Poland, Geographic Proceeding No. 43, Panstwowe Wydawnictwo Naukowe, Warszawa, 1963, quoted in Ronald Victor Peiluck, The Classification System Designated for the Recreation Sector of the Canada Land Inventory Project: A History of its Development and the Background of the Problems Involved in Achieving a Valuable and Useful Classification of Recreation Lands. Unpublished M.A. thesis, University of Manitoba, 1967, pp. 121-125.

> potential intensity of use, have moderate to rugged relief, an abundance of water resources and a high percentage of tree cover. The various degrees of each of the three physical qualities are rated on a point system . . .[9]

There are a few American studies whose approaches are along Canadian-Polish lines.[10] A study by Booth illustrates the American activity in this field with specific reference to lakeshore potential. Booth considers offshore and backshore slopes, beach and offshore materials, offshore vegetation, drainage on the backshore and vegetation on the backshore.[11] Booth is satisfied with four lakeshore physical site types described below:

> Type I sites were defined as those where the immediate offshore bottom is composed of sand with some mixture of small pebbles, where the five-foot underwater contour is from twenty-five to fifty feet offshore, and where a narrow (five to ten feet), sandy-pebbly beach merges into a flat to rolling backshore with a scattered tree growth extending at least fifty yards inland . . .

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[9] Ibid., p. 121.

[10] The writer is aware of three studies: (1) Neal M. Bowers, Kenneth C. McMurry, and Katherine M. Stahl, "Lake-shore Inventory and Classification," Papers of the Michigan Academy of Science, Arts and Letters, Vol. 27, 1941, pp. 337-344, (2) James J. Truncer, A Brief Look at Artifical Public Beach Development in Michigan, for R.D. 870, 1961, mimeographed. Colin K. Campbell's method of site evaluation was based on Truncer's system. Colin K. Campbell, An Analysis of Summer Cottage Shoreland Use in the Georgia Lowland Region of British Columbia. The Canada Land Inventory, A.R.D.A., Recreation Sector, Department of Forestry and Rural Development, Ottawa, September, 1967, 119 pp., (3) Alfred W. Booth, The Lakes of the Northeastern Inland Empire: A Study of Recreational Sites, Bulletin No. 5, The State College of Washington, Bureau of Economics and Research, Pullman, Washington, April, 1948, 32 pp.

[11] Booth's study cited in the footnotes above is summarized in Alfred W. Booth, "Geographic Methodology and Techniques in a Recreational Survey," Professional Geographer, Vol. 8, 1948, pp. 41-45.

> Type II sites were defined as those with pebbly bottoms, with the five foot contour from fifteen to twenty-five feet offshore, with a very narrow pebbly or stony beach from which wooded slopes, usually quite rocky rise up rather abruptly, sometimes at an angle of over twenty degrees . . . .
>
> Type III sites are those where rocky bottoms rise very abruptly to steep rocky onshore slopes . . . .
>
> Type IV sites are those with muddy or marly bottoms with extensive growths of aquatic vegetation particularly tule, water lily, reeds, and other species which grow above water level. No beaches are associated with this type since marshes mark their landward continuations, marshes which in turn are usually backed by flat poorly-drained land.[12]

He does not rate capability as such but by having four grades of lakeshore sites -- proceeding from the most aesthetically favourable for recreation (Type I) to the least (Type IV) -- he implies a capability rating.

All three Canadian classification systems of assessment of recreational landscape capability for recreation distinguish between shoreland and upland. Discussion of the three classification systems will deal only with the shoreland classification criteria.

The first is that of G. Angus Hills. His system is complicated and only the fundamentals will be discussed.[13]

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[12] Ibid., p.43.

[13] An attempt is made to explain Hills' approach in a recent publication: Landscape Architecture Research Office Graduate School of Design, Harvard University, Three Approaches to Environmental Resource Analysis. The Conservation Foundation, Washington, D.C., November, 1967, pp. 7-30.

Hills states that he has devised two use-capability scales ". . . to adequately present different degrees of detail on different scales of maps and to present different points of view."[14] He offers the following description of the first use-capability scale.

> The A to G level of capability classification is used to rank units which are relatively homogeneous for a small group of related activities, for example, (i) shoreland units, ranked for bathing, camping, etc. (ii) hill land, ranked for winter sports, hiking, etc., . . . Usually, shoreland and hill land units which engender the most intensive use are relatively small and can be presented best on maps of scale 20 chains to the inch . . .[15]

Some units, such as lake water, can also be presented on maps of a scale of 1:50,000.

Like the first use-capability scale, the second is expressed in seven levels of capability and is used to rank patterns of units on a larger regional basis. It expresses the total recreation potential of the region or complex.[16] His patterns are mapped by symbols at map scales of either 1:50,000 or 1:250,000.

> These two [use-capability] scales are required to adequately express two different points of view. At the local level, the units are ranked according to their capability to support a group of activities related specifically to the features within the unit

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[14] G.A. Hills, Definition of Capability Classes and Benchmark Sites for the Recreation Land Inventory, Report from Ontario Government, Department of Lands and Forests, Maple, Ontario, 1966, p. 1.

[15] Ibid., p. 1.

[16] Ibid., p. 2.

itself. At the broader level, the features of the individual units are also considered with regard to their capability to contribute variety and balance to the recreational opportunities of the whole pattern . . . .

The two [use-capability] scales used in rating recreational potential are similar to those used in rating the potential of land for other uses. Each capability class indicates the level of capability, that is, the level of intensity or quality of recreational use rather than the kind of use. Since the level of intensity and quality of use is dependent upon the degree of limitation which the area presents to the user, use-capability classes can be defined also in terms of degrees of limitation.[17]

Shown below are the two use-capability scales.[18]

TABLE I

HILLS' TWO USE-CAPABILITY SCALES

Level of Capability	Degree of Limitation	For the Units (Local Scale)	For the Complex (Regional Scale)
Very high	Very Low	A	1
High	Low	B	2
Mod. High	Mod. low	C	3
Moderate	Moderate	D	4
Mod. low	Mod. high	E	5
Low	High	F	6
Very low	Very high	G	7

[17] Ibid., p. 2.

[18] G.A. Hills, "Ranking the Recreational Potential of Land Units by Gradient Analysis," Proceedings National Meeting on Land Capability Classification for Outdoor Recreation. Canada Land Inventory, ARDA, Ottawa, February 23, 24, 1966, p. 14.

In the local A to G scale, Hills establishes benchmarks or guides for the selection of units which are equivalent in use-potential for a natural grouping of attractions, as for example, with reference to shoreland units: (1) bathing beaches and adjoining camping and service grounds, (2) deep shore water for swimming and diving, and adjoining sites for lodging and viewing, (3) wetland wildlife sites, small craft water, angling water.

His class A units, having a very high capability for intensive recreational activities provided by bathing beaches and adjoining grounds for camping and associated services will be singled out as an example of his benchmark definitions:

> Class A lands for the group activities of bathing and camping have no significant limitation in their strategic features, ... Other important local factors which determine the full use of the area, but are not considered strategic, include deeper shore water (d) for swimming, diving and boat launching . . . .
>
> The benchmark for a wet beach with no significant limitation is a shoreline of which each 20 chains is usable and over 16 chains of which is a relatively wide (over 66 feet) sand beach. The remaining 0-4 chains is deeper water close to shore and suitable for swimming, diving and boat launching.
>
> Smooth, deep, permeable, well-drained materials located within 20 feet elevation relative to mean water level and within 20 chains of the shoreline describe grounds with no significant limitation for camping, parking and sunbathing, providing there is from 25 to 45 acres per each 20 chains of shoreline with no limitation for family bathing.[19]

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[19] Hills, Definition of Capability Classes and Benchmark Sites for the Recreation Land Inventory, op. cit., pp. 8,9.

The map symbol for the above grouping is $A\frac{B}{Gd}$. In the following explanation of this symbolization it should be kept in mind that "A" is in the first vertical column, "BGd" in the second, and there are no symbols in the third and fourth vertical columns because there are no limitations to such a site. Hills explains his map symbolization as follows:

> The mapping symbol in common with all A to G scales for this series consists of three (or four) vertical columns. In the first column is placed one of the seven classes (A,B,C,D, E,F or G) which indicates the degree of limitation to the area as a whole. In the second column are placed the main attractions, B for bathing beaches, G for grounds for group camping and services, and d for deeper shore water. The capital B and G indicate these are strategic features and the lower case d an auxiliary feature, in this series. The order remains the same regardless of the relative potential of beach and camping ground. The kind of limitation is shown by the lower case letters in the third and fourth columns.[20]

A second classification system for recreational capability of shorelands is that of McCutcheon. His shoreland units are isolated by: (1) drawing a line around the landward side of the backshore, (2) isolating segments of the shoreland on the basis of similar or dissimilar physical bases as set out below. After delineating shoreland units, his next step involves describing separately by use of appropriate symbols the shorezone and the backshore. For example, for the shorezone the following characteristics are considered: slope of the frontage, width of foreshore, width of offshore, foreshore materials, and offshore materials. He is then able to rate the shorezone and backshore.

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[20] Ibid., p. 6.

A sliding scale is used for the shorezone ratings. The ratings depend on the nature of the frontage, width and quality of the foreshore and offshore, and composition of the shorezone.[21] The ratings range from 1 to 5 in the order: excellent, very good, good, fair, and poor. To illustrate the conditions for each rating we may take the excellent rating as an example.

> Excellent: The shorezone has a level to gently sloping frontage, moderate to wide foreshore, and moderate to wide offshore; all materials consist of clean sand or very fine gravel . . . .[22]

The water body size also is rated at five levels as shown in Table II.

TABLE II

McCUTCHEON'S SYMBOLS FOR WATER BODY SIZE

Water body size	Symbols
10 sq. miles or greater	1
5 to 10 sq. miles	2
1 to 5 sq. miles	3
0.25 to 1 sq. mile	4
Less than 0.25 sq. mile	5

The final capability class for each shoreland unit is derived from the combined lake size, shorezone, and backshore ratings. The ratings are grouped into [a] three digit number in that order (e.g. 123) and this number is compared to . . . [a]colour chart . . . to establish the capability class.[23]

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[21] McCutcheon, op. cit., p. 48.

[22] Ibid., p. 48.

[23] Ibid., p. 43.

Certain combinations, for example 111, 112, would rate Class 1. The lowest class is 5 with a combination of 555. McCutcheon was able to devise 125 different combinations.

An example of McCutcheon's symbolization describing a shoreland unit is as follows:

1
2 2
3

The small 1 in the second vertical column indicates that the lake is greater than ten square miles.[24] The number 2 in the second vertical column indicates that the shorezone consists of a level to gently sloping frontage (0 to 15 per cent slope), a narrow to moderate foreshore (up to 50 feet wide), and a moderate offshore (25 to 200 feet), all consisting of sand or gravel. A level gently sloping backshore that extends landward up to 300 feet from the landward limit of the frontage is described by the three. The large two in the first vertical column is the capability class resulting from the combination of the ratings 123.

McCutcheon like Hills also makes a provision for the use of limitation symbols, though his list is not very comprehensive (eleven symbols referring predominantly to shoreland conditions).[25] For example, if necessary in the symbolization the limitation symbol would be placed after either the 1, 2, or 3 in a third vertical column. A "3d" would indicate a 3 rating with a drainage problem. A "3" rating, as in the above symbolization, without a limitation

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[24] Ibid., pp. 59, 60.

[25] Ibid., pp. 60, 61, 63.

symbol would indicate the best possible conditions which may lead to such a rating.

Though McCutcheon does not discuss expressedly the basis of his system, the greatest recreational use of each unit is implicit in the physiographic conditions used as the basis for the capability ratings.

The CLI land capability classification system for outdoor recreation pertaining generally to shorelands is the third Canadian system of recreational land use assessment. The basis of the classification is " . . . THE QUANTITY OF RECREATION WHICH MAY BE GENERATED AND SUSTAINED PER UNIT AREA OF LAND PER YEAR UNDER PERFECT MARKET CONDITIONS. . . . "[26]

Some of the main provisions of the classification system are as follows:

> Land is classified according to its natural capability to provide opportunity for recreation . . . .
> . . . . Sound recreation land management and development practices are assumed for all areas in practical relation to the natural capability of each.
> . . . . No judgment is made concerning the possibility of major modification of land which may make it suitable for recreation use.
> . . . . Location and present access development do not influence classification (i.e. perfect market conditions prevail, which implies uniform demand and accessibility throughout the inventory area) . . . .
> . . . . Present use or management factors do not influence ratings except that: . . . . Land at present firmly committed

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[26] Canada Land Inventory, op. cit., p. 7.

to intensive urban or industrial use is normally not classified . . . .[27]

On the above basis, seven capability classes are differentiated (see Table III).[28]

TABLE III

THE SEVEN CLI CAPABILITY CLASSES

Class	Level of Capability
1	Very high
2	High
3	Moderately high
4	Moderate
5	Moderately low
6	Low
7	Very low

The system suggests that capability classes be determined by present popular preferences and assessed in terms of quantity of use.[29] Following from this, twenty-five recreation features or subclasses are recognized (Table IV).

The criteria for each subclass are given in detail. For example, the criteria for a Class 1 Beach (1B) subclass will illustrate the attempt of the CLI toward an empirical and quantitative approach. The water body should be six square miles in area or 10 miles in length. Water temperatures should be

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[27] Ibid., p. 4.

[28] Ibid., pp. 8,9.

[29] Ibid., p. 13.

TABLE IV

CLI RECREATION FEATURES OR SUBCLASSES*

Symbol	Recreation feature or subclass	Description
A	Angling	Land providing access to water with natural capability for production, harvesting and/or viewing of sport fish.
B	Beach	Shoreland capable of supporting beach activities.
C	Canoe Tripping	Land fronting and providing direct access to waterways with capability for canoe tripping.
D	Deep Inshore Water	Shoreland with deeper water inshore suitable for swimming or boat mooring or launching.
E	Vegetation	Land with significant vegetation.
F	Waterfalls and Rapids	
G	Glacier	Glacier or area offering a glacier view or experience.
H	Historic Site	An historic, or prehistoric, site or feature.
J	Gathering and Collecting	Areas offering particular opportunities for gathering or collecting items of popular interest.

*All definitions have been quoted directly from CLI Field Manual, pp. 14-113.

TABLE IV (continued)

Symbol	Recreation feature or subclass	Description
K	Organized Camping	Shoreland or upland associated with a recreation feature suited to organized tent or trailer camping.
L	Landforms	Areas containing natural landform features other than rock formations.
M	Small Surface Waters	Frequent small water bodies or continuous streams occurring in upland areas.
N	Lodging	Land (usually shoreland) suited to family cottage or other recreation lodging use.
O	Upland Wildlife	Land with capability for viewing or hunting of upland wildlife species.
P	Cultural Landscape Pattern	Areas exhibiting diversity of cultural landscape.
Q	Topographic Patterns	Patterns of topography and landform or land and water exhibiting diversity of natural landscape.
R	Rock Formations	Rock and rock formation or associated geological or erosional phenomena.

TABLE IV (continued)

Symbol	Recreation feature or subclass	Description
S	Skiing Area	A combination of slopes, snow conditions and climate capable of providing downhill skiing opportunities during a normal season.
T	Thermal Springs	
U	Deep Water Boat Tripping	Shoreland fronting water accommodating yachting or deep water boat tripping.
V	Viewing	A vantage point which provides a superior view (relative to the class of the unit(s) which contain it, and to other possible viewpoints) of a land or seascape; or a corridor or other area which provided frequent good viewing opportunities.
W	Wetland Wildlife	Land with capability for viewing or hunting of wetland wildlife species.
X	Miscellaneous	A feature with recreation capability not adequately covered by any other symbol.
Y	Family Boating	Shoreland adjacent to water suitable for popular forms of family boating activity.
Z	Man-made Features	Areas exhibiting major, permanent, non-urban, man-made structures of recreational interest.

"comfortable" during season of peak use. Furthermore, the water should be clear and free of hazards and aquatic nuisances.

> . . .. the wet beach should generally range from 2-5%, and be composed of clean, fine-grained materials ranging from fine sands to pea-sized pebbles (i.e. it must be largely comfortable for naked feet to walk and play on). There should be 1,000 feet of beach within a 1/4 mile length of shoreland.[30]

Within 1,000 feet of the beach there should be 25 acres of generally level to gently sloping backshore to support development and facilities. The soil should be capable of supporting a good vegetative cover and largely free of rocks and boulders. Table V further illustrates the various limitations affecting the capability of beaches.

All classification and rating is done on maps. All land units are assigned a combination of symbols indicating in order of significance either vertically or horizontally: (1) capability class, 1 to 7, (2) whether shoreland (S) or upland (U), (3) up to three subclasses. An example of a combination of symbols for a shoreland unit would be: $2SK^{B}_{A}$ or 2SBKA. By this is indicated a Class 2 shoreland unit with a bathing beach (B), terrain suited for camping (K), and accessible to adjoining angling water (A).[31] In the above symbolization "K" and "A" are the subordinate subclasses or respectively the secondary and tertiary recreational features. For an upland unit an example of a combination

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[30] Ibid., p. 23.

[31] Ibid., p. 11.

TABLE V CLI LIMITATIONS AFFECTING CAPABILITY OF BEACHES

	0	1	2	3	4	5	6
WATER QUALITY		MODERATE WEED PATCHES	← EXTENSIVE WEEDS →				
		← MURKY WATER (no pollution) →	← AQUATIC NUISANCES (no health hazard) →			← POLLUTION (degree of limitation depends on prevalence and hazard)	
			← COOL WATER (limits swimming) →	← COLD WATER (limits bothing) →		← V. COLD WATER (precludes use)	
MISCELLANEOUS			← BEACH EXPOSED → (limitation depends on prevalence of condition)				
SPECIAL HAZARDS			← DANGEROUS SLOPES, CURRENT OR UNDERTOWS → (severity of limitation depends on prevalence of condition)				
BEACH GRADIENTS (general conditions)	8%	less than 1%	10%	12%	15%	more than 15%	not a B
BEACH MATERIALS (comfort & hazard factor)		PEBBLES OVER PEA-SIZE FIRM TILL	COBBLES GRAVEL	SMOOTH BED ROCK	BOULDER – PAVEMENT ROUGH BED ROCK	SHARP UNSORTED ROCKS	
DEVELOPMENT AREA		NUMEROUS BOULDERS	UNSTABLE DUNES POOR SOIL COVER ONLY 50% OF REQUIRED AREA	EXTENSIVE ROCKINESS	BOULDER PAVEMENT MINIMAL DEV–ELOPMENT AREA AVAILABLE		
ACCESS PROBLEMS		SLIGHT	MODERATE	SEVERE		V. SEVERE	
	0	1	2	3	4	5	6

INSTRUCTIONS FOR USE:

1. Ascertain approximate value for individuol limitations.
2. Total values for all limitations :

value 2	downgrade 1 class
4	" 2 classes
6	" 3 classes
8	" 4 classes
8+	look for other features

3. These are generol guide lines. Do not deduct full points where limitations overlop (e. g. exposed beoch and very cold water; aquatic nuisances and extensive weeds).
4. Presence of other recreation features may overcome a degree of limitation.

From: Canada Land Inventory, Agricultural Rehabilitation and Development Act and Rural Development, Field Manual : Land Capability Classification For Outdoor Recreation, June, 1967, p. 27

of symbols would be: $\begin{matrix} H \\ 3UQ \\ K \end{matrix}$ or 3UHQK.

By this is indicated a Class 3 upland unit with a historic site (H), patterns of topography and landform or land and water exhibiting diversity of natural landscape (Q), and terrain suited to camping (K). Once again the "Q" and "K" are the subordinate subclasses or respectively the secondary and tertiary recreational features. It should be mentioned that subordinate subclasses may be relatively insignificant and the capability class should not be interpreted to the secondary or tertiary recreational features.[32] For example, the above upland unit is Class 3 because of the historic site and one should not assume that the topography (Q) and camping (K) subclasses are also of a Class 3 calibre. The "Q" alone may be of a Class 4 calibre and the "K" of a Class 5. Thus, the rating of this unit as Class 3 has been done solely on the strength of the historic site.

Each of the three systems discussed has its merits and shortcomings. Hills' system is very detailed but complex. It has as one of its advantages over the CLI system the rating of the lake water body itself. The CLI system for shorelands concentrates on the shorelands and only indirectly takes into account the water body. Hills' use of natural groupings of attraction symbols (e.g., B,G,d) probably results in less likelihood of confusion in mapping as opposed to the CLI system. However, the CLI system allows greater freedom of combing recreational features and thus at times results in more flexible combinations of symbols

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[32] Ibid., p. 10.

for land units. Hills' criteria are very rigid and would involve much slope measurement; thus the time element and the area to be covered become factors of importance. From the point of view of time, the CLI and the McCutcheon classifications are easier and quicker to apply. McCutcheon's classification tells more about an area's physical recreational resources than either Hills' or the CLI systems. On the other hand McCutcheon's classification does not reflect adequately different site requirements of various recreationists which the CLI uses as one of its premises for capability classes. For example, campers and picnickers prefer shallow offshore gradients as opposed to cottagers preferring steeper offshore gradients enabling boat mooring. This is taken into account in both the CLI and Hills' classifications, but not in McCutcheon's.

Thus, it can be seen that neither of the three systems is infallible and that each has much to offer. The CLI and Hills' classifications are probably superior to McCutcheon's though the use of either classification could depend on the nature of the study, personal preference, and other circumstances.

In the assessment of the shoreland capability for recreation of the lakes in the study region, the CLI classification with slight modifications, is used. The major reason is convenience and familiarity with the system, resulting from the author's employment with the Alberta branch of the Canada Land Inventory ARDA Recreation Study.

One restriction and two modifications to the CLI system were made to adapt its relevance to mapping in this study. The restriction was to

drop the S from the combinations of symbols, since only shoreland units were being mapped and its use would be redundant here. The first modification was to refine the divisions in Class 1B and 2B categories. These have now become Class 1+B and Class 1-B, and Class 2+B and Class 2-B. This distinction was made on the following basis.

TABLE VI

REFINED CLASS 1B AND 2B CATEGORIES

Class	Criteria
1+B	Class 1B with no limitations *
1-B	Class 1B with 1 limitation point. *
2+B	(a) 1,000 feet of beach with 2 limitation points, OR (b) 300 feet of Class 2B with no limitations.
2-B	(a) 1,000 feet of beach with 3 limitation points, OR (b) 300 feet of Class 2B with 1 to 3 limitation points.

* Refer to Table 1.

This modification was introduced so as to establish a distinction in Class 1B units between truly outstanding beaches and excellent beaches. This lack of

differentiation was even more evident in Class 2B and the writer feels that the above alteration improves the assessment.

The success of any classification will depend on the flexibility it allows for the introduction of the use of limitation symbols for the information of the user or planner. This provision has been built into both the Hills and McCutcheon systems. The writer feels that this provision for the use of limitation symbols is a very important element in a classification system and consequently the second modification to the CLI system was to add limitation symbols to the combination of symbols. It is felt, like Hills and McCutcheon, that the use of limitations indicating the disadvantages of a land resource unit would make the rating of each unit more meaningful as well as allow more detail to be mapped. More detail would be obtained because units could be differentiated on the basis of limitations.

Tables VII and VIII list the introduced limitation symbols. They are divided into water (Table VII) and shorezone (Table VIII) limitations with the relevant descriptions.[33]

In mapping of the final symbol combination the limitation symbols, in lower case, follow the subclasses. As subclasses, the limitation symbols are arranged in descending order of significance as a limiting detraction. The limitation symbols on the map may appear either beneath the subclasses

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[33] Most of the limitation symbols were obtained from: Canada Land Inventory, ARDA, Classification of Land Capability for Recreation: Interim Manual to Guide Pilot Projects in 1965, May, 1965, pp. 16-17. At this time CLI was contemplating the use of limitations to recreational use.

TABLE VII

WATER LIMITATIONS

Symbol	Description
d	Water depth inadequate for some aquatic activities.
f	Water area inadequate for: (1) aquatic activities such as sailing, motor boating and water skiing, (2) Class 1B.
j	Fluctuating water level.
k	Normal water temperatures too cold for swimming.
n	Poor water quality due to natural aquatic nuisances (e.g., underwater or surface weed beds) or pollution (mineral or organic).
p	Artificial pollution of water.

TABLE VIII

SHOREZONE LIMITATIONS

Symbol	Description
a	Beach activities limited by steep slopes offshore.
b	Limited usable beach backed by steep or cliffed slopes.
c	Till or clay beach, little or no sand.
e	Erosion hazards a limitation, e.g.,steep slopes, susceptibility to slumping, light soils unable to hold cover under use.
g	No beach due to excessively steep or cliffed shoreline.
h	Use of beach and offshore zones limited by stones.
l	Beach suited to bathing limited in length.

TABLE VIII (continued)

Symbol	Description
m	Use of shoreland limited by mud flats, marsh, or muskeg.
o	Lacks level or gently sloping area suitable for constructing support facilities necessary for intensive use types of development.
q	Sandy wet beach but with no dry beach due to dense vegetation or a small rise in the backshore at the water line.
r	A stony or rocky surface offering a hindrance to use or development.
s	Sand of inferior quality, i.e.,contains a high degree of silt or organic matter.
t	Steep slopes hindering access or use.
v	Very shallow wet beach, e.g.,2 per cent slope.
w	Impaired drainage -- a hindrance to use or development.
x	Sparse or poor tree cover.
y	Serious insect problem.
z	Beach activities limited by man-made development on the backshore, e.g.,a major road.

separated from the latter by a horizontal line, $\frac{3BKY}{nha}$, or following the subclasses horizontally, separated by a slash (/) -- 3BKY/nha. The symbolization 3BKY/nha therefore indicates a shoreland unit of moderately high capability with a bathing beach (B), associated with terrain suited to camping (K), and a shoreland adjacent to water suitable for popular forms of family boating activity (Y). The site has limitations of poor water quality due to natural aquatic nuisances or pollution (n), stones on the beach and offshore zones (h), and the

beach activities are limited by steep slopes offshore (a). Without the limitation symbols the CLI information would indicate only the information supplied by the subclasses BKY. One would not know exactly why the particular beach was a Class 3 type. The limitation symbols, here, make it quite obvious that the major limitation of the site is poor water quality due to natural aquatic nuisances or pollution, with the additional limitations of stones on the beach and offshore zones and steep slopes offshore. Thus, the value of adding the limitation symbols is evident.

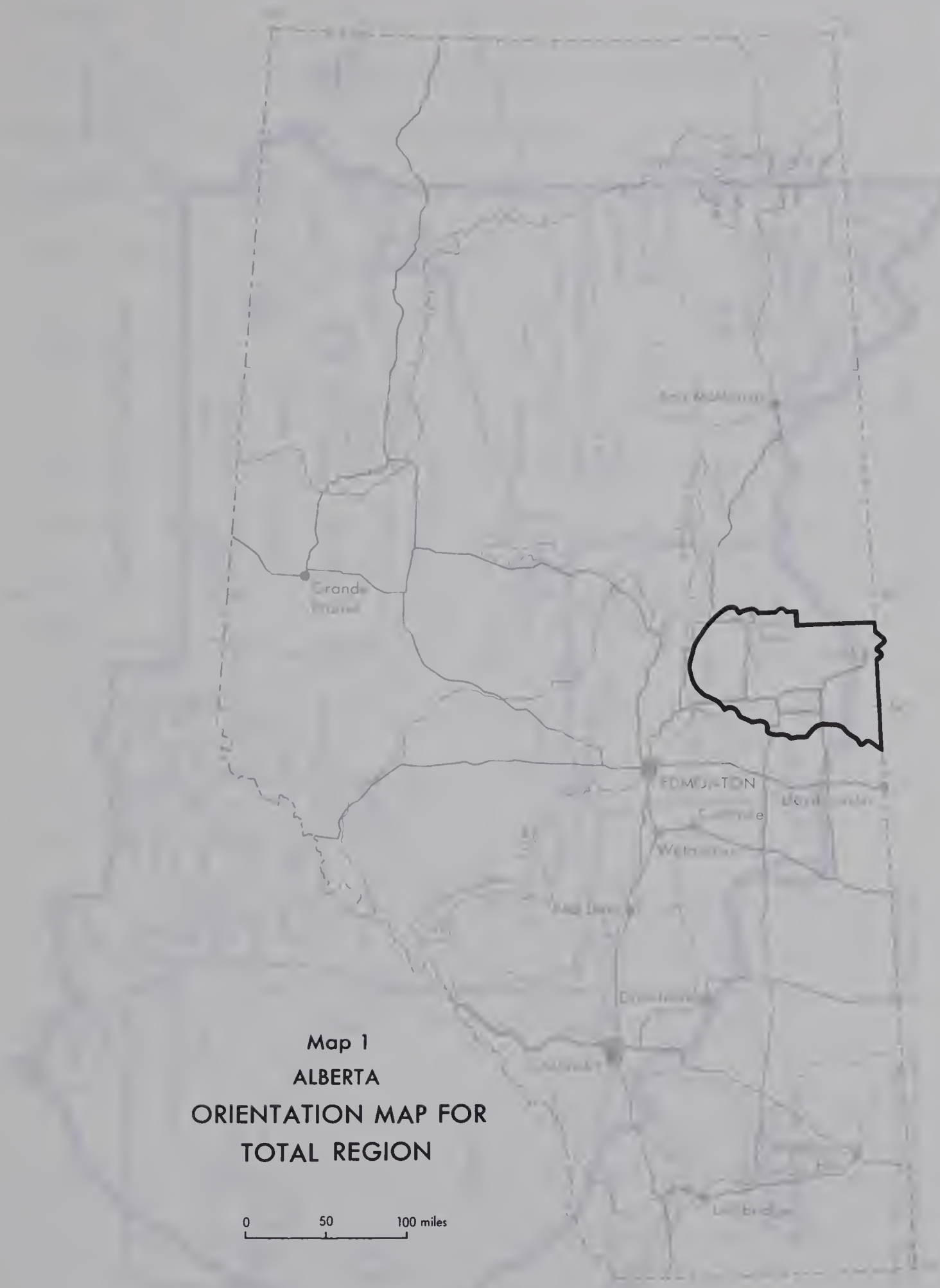
CHAPTER II

PHYSICAL GEOGRAPHY OF THE NORTH-CENTRAL ALBERTA LAKE REGION

Delimitation of the Region

The boundary of the region was demarcated partly on physical and partly on political grounds. On the south the North Saskatchewan River and in the west a rock stratum (approximately between 54° 15' and 54° 40' North Latitude, 112° 45' West Longitude) form two natural boundaries (see Maps 1 and 2). In the east the Alberta-Saskatchewan border forms the boundary, though Cold Lake, part of which lies in Saskatchewan is included in its entirety. For mapping convenience the northern boundary was extended to a line only a short distance south of the Primrose Lake Air Weapons Range. However, Spencer Lake which lies inside the Air Weapons Range area was included in the study area because it is an important lake in the series of lakes of which it is a part. An arbitrary line extending westwards on the north side of Touchwood Lake and along the northern shores of Square Lake and Lac La Biche forms the remainder of the northern boundary.

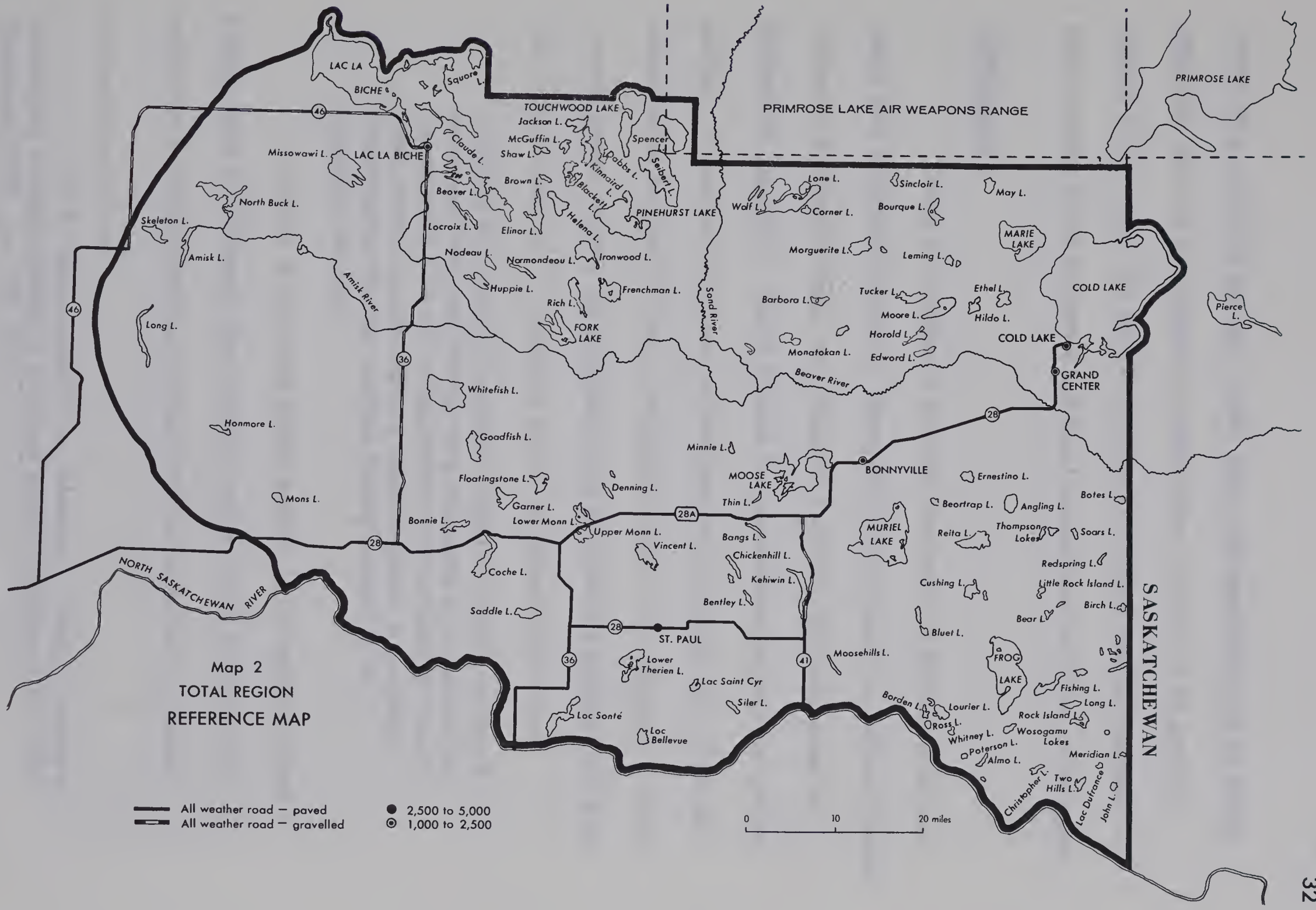
Obviously, the proper assessment of a region for outdoor recreation can only be done by appreciating the total environment. This must include the weather and climate situations in which people will use it. Thus the natural



Map 1

ALBERTA

ORIENTATION MAP FOR TOTAL REGION



Map 2
TOTAL REGION
REFERENCE MAP



terrain (e.g., surficial geology, relief, soils, and vegetation) will be briefly described, and will be followed by a description, not only of the general climate of the region, but also of an analysis of climate from the standpoint of human comfort in the enjoyment and use of recreational activities in the region.

Physiography

Many of the lakes in the study area occur in depressions on hummocky land or dead-ice moraines, former meltwater channels, or between glacial flutings or drumlinoid ridges, etc., associated with the Wisconsin phase of Pleistocene glaciation. Map 3 presents in a generalized manner, the surficial geology. It may be anticipated that the picture is a complex one. From the orientation of the glacial flutings, drumlinoid ridges, etc., as shown in Map 3 it would appear that the ice advanced at one time from the northeast and then from the northwest. C. P. Gravenor and W. A. Meneley state that:

> Although more data are required it might be speculated that the southwest Cold Lake flutings were developed by a regional ice advance and later during deglaciation the southeasterly Lac La Biche trend was produced by a local readvance or successive readvances of the ice--perhaps flowing parallel to the retreating ice front. [1]

A result of the varied glacial activity in the region has been to produce lakes of all shapes, sizes, depths, and directions of orientation. A majority of the lakes stretching southeast from Lac La Biche are oriented

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[1] C. P. Gravenor, and W. A. Meneley, "Glacial Flutings in Central and Northern Alberta," American Journal of Science, Vol. 256, December, 1958, pp. 725, 726.

Map 3

TOTAL REGION

GENERALIZED SURFICIAL GEOLOGY

1 Areo of maximum glociol loke coverage

2 Hummocky terroin (e. g. hummocky, deod-ice moroine; proirie mounds)

3 Ground moroine

Glaciol lineotion porallel to ice-flow direction (orrowheod indicotes sense of direction); includes glocial fluting, drumlinoid ridge, drumlin, crog ond toil hill, roches moutonnées

Meltwoter channel, spillwoy

0 10 20 miles

Major Source: *Glacial Map of Canada*, Geological Survey of Canada, 1967



northwest-southeast. Some of them southwest of Cold Lake have a pronounced northeast-southwest orientation. Others lying on the hummocky and dead-ice moraines, e.g., east of Frog Lake, are generally circular or else if linear, have no common orientation. Some are very deep (e.g., Amisk, Touchwood, Wolf Lakes). Lakes like Amisk are deep because of their location in a former meltwater channel whereas Touchwood and Wolf in the northeastern section could well have been gouged out by the actual glaciers.

Muskeg occurs in patches within the region, as for example: between Lac La Biche and Cold Lake north of the Beaver River, and west of Whitefish Lake. The amount of muskeg found north of the Beaver River within the study area is much less than the amount found outside it to the north.

Physiographically the region is a lowland area which acts as a catchment basin for much of the surrounding upland. This accounts partially for the great number of lakes in it. The low lying area runs diagonally from the northwest to the southeast--Map 4. The local elevation is approximately 1,000 feet. Elevations below 1,700 feet above mean sea level occur around Bonnyville and on the Beaver River at the Saskatchewan border. To the east of Kehiwin Lake occurs the highest point in the region--2,690 feet above mean sea level. In one of the upland areas east of Frog Lake a height of 2,415 feet is attained southwest of Redspring Lake. North of the main lowland area the land rises to a height of 2,453 feet between Touchwood and Spencer Lakes. South of Wolf Lake a height of 2,471 feet is reached. In the upland area in the southwest a height of 2,381 feet is attained just east of Lac Bellevue. A height of 2,466

LOWLAND

HIGHLAND

LOWLAND

2000

2500

Map 4
TOTAL REGION
GENERALIZED RELIEF

Contour interval 500 feet

0 10 20 miles



occurs on the aforementioned rock stratum to the northwest of Long Lake on the western boundary.

Another seemingly important reason for the proliferation of lakes in the region arises from the status of the water balance.[2] A slight annual surplus of moisture usually occurs and this is enough to keep the lake basins filled. There is not, however, enough of a surplus to cause the formation of major drainage channels which could drain the lakes quickly, hence they have been maintained at a nearly constant level. Furthermore, much of the muskeg drains from the northern uplands through springs into the lakes in the region. In the upland to the north of the lowland area, there is a considerable surplus of moisture and the lakes tend to be drained by outflow. South of this region, on the other hand, the region of east-central Alberta, has no dependable surplus of moisture and thus there is no water to flow into the basins, consequently there are few lakes there.

The enormity and variety of fluvio-glacial activity in this region have resulted in much outwash material, especially sand. This combination of large amounts of water, variety in lake basins, and wide deposition of sand has

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[2]Personal communication with Dr. A. H. Laycock, Department of Geography, University of Alberta, Edmonton, Alberta, February, 1969. The usual water balance equation is: "'Precipitation equals Evapotranspiration (Potential Evapotranspiration minus Deficit) plus Surplus plus or minus Storage Charge.'" Defined in: A. H. Laycock, Water Deficiency and Surplus Patterns in the Prairie Provinces. Hydrology Division, Prairie Farm Rehabilitation Administration, Regina, Saskatchewan, March, 1967, Report No. 13, p. 8.

caused evolution of a topography that has a very high outdoor recreational potential.

Soils

The soils of the region (Map 5) are predominantly grey-wooded and, for the most part, are of doubtfully arable to non arable quality.[3] Some portions are definitely arable. Such areas are found in present use along the North Saskatchewan River and generally on either side of Highway 28A and 28 to Cold Lake. A large area of soils exhibiting doubtfully arable qualities is found in the central and eastern portions too. There are, however, two large areas and one smaller area of non arable soils. One large one lies in the northern half of the region stretching from Lac La Biche to Cold Lake, for the most part lying north of the Beaver River. The second large one lies in the western portion of the region. There are many lakes in this area too but their recreational potential is lower than that of the northern zone lakes. To the west and east of Frog Lake lies the third but smaller non arable zone. Like the previous zones this also contains many lakes. Their recreational potential too is high while Frog Lake, situated here, will be seen to have an outstanding rating.

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[3]Personal communication with A. A. Kjearsgaard, Alberta Soil Survey Research Branch, Canada Department of Agriculture, Edmonton, Alberta, 1968. Map 5 also illustrates the texture and organic content of the soils and the topography.



Map 5

TOTAL REGION

PRELIMINARY GENERALIZED SOIL MAP

ARABILITY

- A Arable
- B Doubtful
- C Non Arable

SOILS

- GW Grey Wooded
- DGW Dark Grey Wooded
- BC Block Chernazem
- DGC Dark Grey Chernazem
- P Podzal
- PR Padza-Regasol

TEXTURE

- 1 Medium
- 2 Sandy
- 3 Medium and Sandy

TOPOGRAPHY

- o Undulating
- b Gently Ralling
- c Rolling

ORGANIC

- i 10 %
- ii 20%
- iii 30%
- iv 20-30%

NI — No Information

SYMBOLIZATION: Arability/Soils, Texture, Topagraphy, Organic
: E. g., A/GW1oi

Source: *Personal cammunicatian with A A Kjearsgaard, Alberta Sail Survey, Research Branch, Canada Department af Agriculture, Edmantan, Alberta, 1968*



Thus, within the non arable soil zones there are, fortunately for the region, lakes with excellent outdoor recreational potentials. A number of lakes of a high recreational capability are found within the arable soil zones as well. The possibility exists of pollution from agriculture of these lakes. This aspect is considered in the next chapter.

Vegetation

Natural vegetation is found on partially cleared farms, in the non arable areas, and in the Government protected northern forest area. What vegetation remains today after agricultural and other use in the region consists predominantly of aspen poplar (Populus tremuloides). However, scattered stands of coniferous evergreen trees are to be found also.

Intensive cultivation takes place along the North Saskatchewan River on the arable soil zones. However, as the Saskatchewan provincial boundary is approached, the intensity of cultivation decreases from more than 50 per cent to less than 50 per cent cultivated.[4] The non arable soil zones are on the whole, not cultivated anywhere. Much of the land to the west, north and east of Frog Lake, extending out past the non arable soil zone, is also uncultivated and is still covered by natural vegetation. The land south-west of Cold Lake and southeast of Lac La Biche is cultivated less than 50 per cent.

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[4]Vegetation map, Alberta Government and the University of Alberta, 1965.

Much livestock raising is engaged in, especially in the less cultivated area near the Saskatchewan border. Among the ways of clearing trees and shrubs and thus increasing grazing capacity in the region, still appears the firing of the trees and shrubs. This has often resulted in fires burning completely out of control and devastating much shade cover which recreationists desire around many of the high potential lakes, e.g., Frog, Muriel, Beaver Lakes. Furthermore, where a lake of high potential is surrounded by agricultural land, trees have been removed down to the water's edge in most cases. From a recreational standpoint the potential of the lake is reduced by such practices which can be readily legislated against. Farmers could be encouraged by Provincial Authorities to retain around every lake which has reasonable recreational potential, a belt of trees of a stated depth.

The Northern portion of the region happens to fall within the "Green Area" (Map 6) where agricultural development, other than grazing, is not permitted legally. The Alberta Department of Lands and Forests

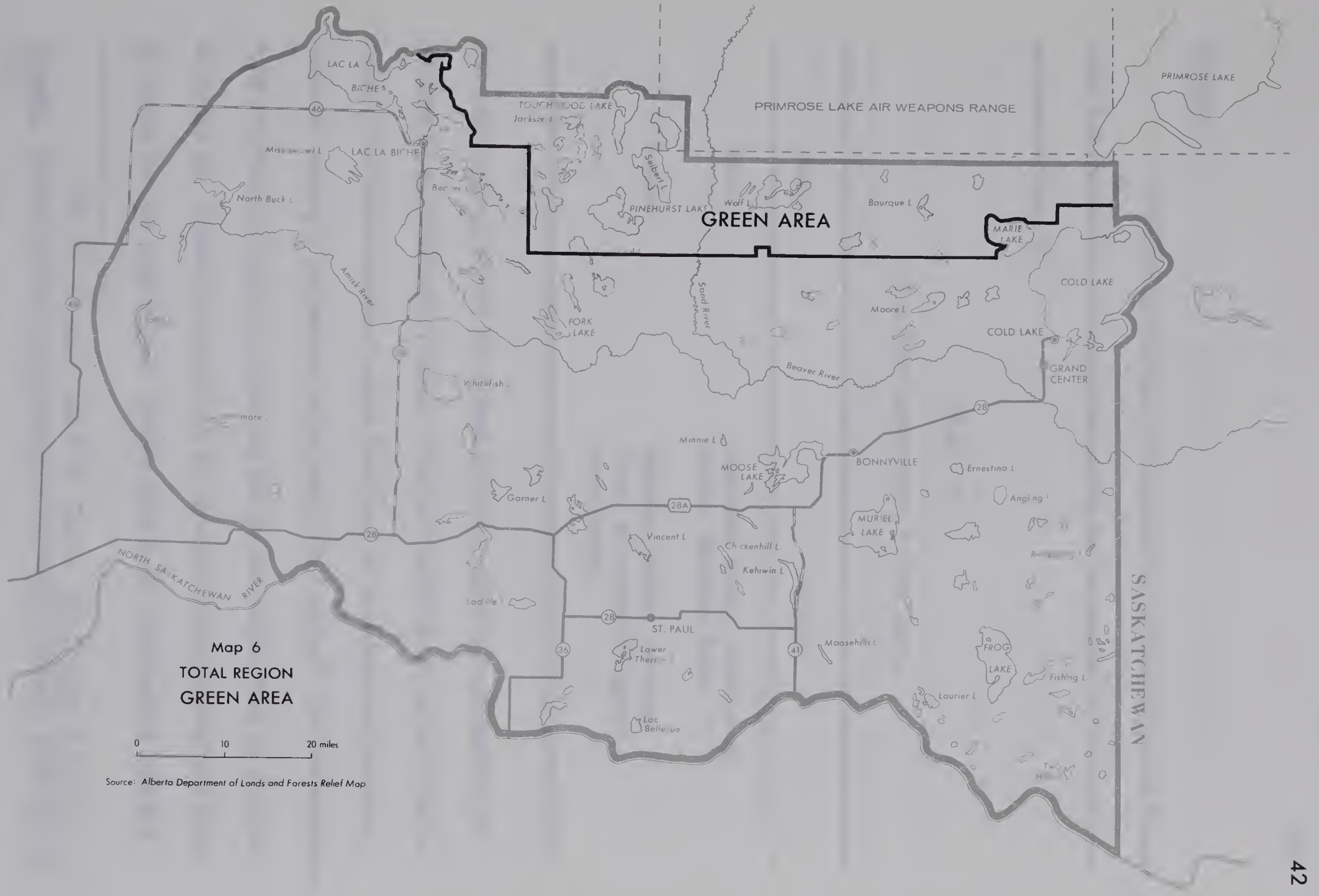
> . . . has a classification committee which divides the Crown Land into broad land use areas, namely, green area, yellow area and white area. This classification is based mainly on the soil classification. Basically it is a zoning for administration purposes and does not affect privately owned land. [5]

Provincial public lands within the Green Area are normally managed for multiple uses including forest production, water, recreation, fish and wildlife, grazing, and industrial development. [6] Here the vegetation is protected from fire and mis-use.

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[5]Alberta Department of Lands and Forests, Policy Concerning Administration of Public Lands in Alberta, October, 1968, p. 1.

[6]Alberta Department of Lands and Forests.



Map 6
TOTAL REGION
GREEN AREA

0 10 20 miles

Source: *Alberta Department of Lands and Forests Relief Map*



Climate

Kendrew and Currie, writing about the climate of Central Canada, state that the dominant air masses responsible for the weather in this region are as shown in Table IX.[7]

TABLE IX

AIR MASSES AFFECTING STUDY AREA

Season	Air Mass
Winter	Maritime Arctic, Continental Arctic, Maritime Polar
Summer	Maritime Arctic, Maritime Polar, Continental Tropical on occasions.

The thesis region is part of the Central Canadian region and consequently is affected by the indicated air masses. The Maritime Polar air during winter in crossing the Western mountain ranges loses much of its moisture and warms by adiabatic heating in the descent on the east of the Rockies.[8] Both the Maritime Polar and Maritime Arctic air masses are warmer and moister than the Continental Arctic air. Westerly currents carry the Maritime Polar and Maritime Arctic air masses over the study region. On the other hand, the intensely cold and

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[7] W. G. Kendrew, and B.W. Currie. The Climate of Central Canada. Queen's Printer and Controller of Stationery, Ottawa, 1955, pp. 15-18.

[8] Ibid., p. 15.

dry Continental Arctic air is carried by northerlies and northwesterlies.[9] The Continental Tropical air of summer, Kendrew and Currie state, is a hot and dry air that appears on occasions from the southwest U.S.A.[10] This air mass is sometimes so dry as to damage vegetation. There is therefore, a seasonal variability as to the frequency of the prevailing air masses influencing the region, and this provides the materials for the climatic environment in which recreationists in Central Canada must seek their comfort or evade discomfort.

There are only four official weather stations within the study region.[11] For all these (Cold Lake, Elk Point, Iron River, Lac La Biche) temperature and precipitation data are available. Wind and cloudiness data are available for only Cold Lake and Lac La Biche.

Table X shows the mean monthly temperatures at the four weather stations. The temperatures are essentially the same for all the stations for each individual month, though the Cold Lake and Lac La Biche stations tend to be warmer throughout the year than the Elk Point and Iron River stations. The range over which the temperature runs between the months of January and July for Cold Lake for example, is 64.9°F. For the same period for Lac La Biche, the range is 60.9°F. As with temperatures, the Cold Lake and Lac La Biche stations tend to record higher precipitation values than the Elk Point and Iron

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[9] Ibid., p. 14.

[10] Ibid., p. 18.

[11] The four weather stations went into operation during different years. Elk Point began in 1917, Iron River in 1925, Lac La Biche in 1944, and Cold Lake in 1953.

TABLE X

MEAN MONTHLY TEMPERATURES (°F)

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Cold Lake A*	-2.1	7.5	18.0	35.5	50.1	56.6	62.8	59.8	50.0	39.8	21.9	11.8
Elk Point	-0.9	4.3	16.2	35.8	49.2	55.3	61.5	57.7	48.4	37.6	19.2	5.8
Iron River	0.0	4.9	17.1	36.3	50.0	57.1	61.7	58.4	49.0	38.7	20.2	6.6
Lac La Biche A	1.4	6.7	18.1	36.2	50.1	57.4	62.3	59.5	50.0	39.4	21.2	8.5

*A -- Airport

Source: Canada, Department of Transport, Meteorological Branch, Temperature Normals for Alberta, CDS No. 9-64, December, 1964, pp. 3, 4, 5.

River stations. Approximately 30 per cent of the precipitation occurring at the four stations is snow and occurs predominantly during the months from November to April, see Table XI. Despite the fact that approximately 50 per cent of the precipitation falls during the months of June, July, and August mean cloudiness during the daylight hours is lower for these months--especially July and August. This is shown in Table XII for the Cold Lake and Lac La Biche stations. This means that during the months of July, Lac La Biche receives on the average only 44 per cent of the possible sunshine in contrast with this, only 36 per cent in January, March, and September.

From Table XIII it can be seen that the mean and mean maximum wind speeds for the months of July and August at Cold Lake and Lac La Biche tend to be less than for the rest of the spring, summer, and fall months.

Two other very pertinent aspects of the wind are the prevailing direction and speed during daylight hours. An analysis of the wind speeds at Lac La Biche and Cold Lake, using the selected daylight hours of 0500h, 1100h, and 1700h for the month of July as an example, shows (Table XIV) that the most prevalent wind speed is between 1 and 12 miles per hour.[12] The lakes are the

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[12]The wind speeds are in m.p.h. and the categories (e.g., 1 - 12 m.p.h.) used are those of the Department of Transport, Meteorological Branch. The categories are based on the Beaufort Scale. For example, 1-12 m.p.h. is equivalent to Beaufort Scale numbers 0 to 3 or from calm conditions to a gentle breeze. Howard J. Critchfield, General Climatology. Prentice-Hall, Inc., Englewood Cliffs, N. J., 1960, p. 48.

TABLE XI

MEAN MONTHLY PRECIPITATION IN INCHES

Station	Element	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Cold Lake A	R*	.01	.01	.13	.39	1.25	3.29	3.49	3.14	1.60	.36	.09	.05
	S*	9.8	7.0	9.0	6.7	1.6	T*	0.0	T	0.6	3.9	9.1	10.4
	P*	.99	.71	1.03	1.06	1.41	3.29	3.49	3.14	1.66	.75	1.00	1.09
Elk Point	R	.01	T	.02	.38	1.26	2.91	2.77	2.42	1.53	.46	.11	.02
	S	6.8	5.5	6.8	4.8	1.0	T	0.0	0.0	0.6	3.8	7.1	7.9
	P	.69	.55	.70	.86	1.36	2.91	2.77	2.42	1.59	.84	.82	.81
Iron River	R	.01	.00	.02	.36	1.30	2.75	2.28	2.23	1.38	.32	.08	.01
	S	4.9	4.6	5.7	3.9	1.1	0.0	0.0	0.0	0.5	3.6	7.9	6.5
	P	.50	.46	.59	.75	1.41	2.75	2.28	2.23	1.43	.68	.87	.66
Lac La Biche A	R	.02	.01	.07	.31	1.20	2.64	2.83	2.74	1.75	.31	.10	.03
	S	10.1	7.3	8.0	7.1	1.6	0.0	0.0	0.0	0.5	4.7	8.7	10.2
	P	1.03	.74	.87	1.02	1.36	2.64	2.83	2.74	1.80	.78	.97	1.05

*T -- Trace, *R -- Rain, *S -- Snow, *P -- Total precipitation.

Source: Canada, Department of Transport, Meteorological Branch, Precipitation Normals for Alberta, CDS No. 5-65, May, 1965, pp. 3,4,5.

TABLE XII

MEAN MONTHLY CLOUDINESS AS MEASURED AT 1100h and 1700h, 1955-64

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Cold Lake A	69	68	69	68	68	69	64	64	68	66	70	70
Lac La Biche A	64	65	64	62	63	63	56	57	64	64	67	67

Source: Canada, Department of Transport, Meteorological Branch, Monthly Records: Meteorological Observations in Canada, 1955 to 1964 inclusive issues. Compilations courtesy Professor R. W. Longley of the Department of Geography, University of Alberta.

TABLE XIII

MEAN WIND SPEED AND MEAN MAXIMUM WIND SPEED, 1955-64

Station	Type of wind speed	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Cold Lake A	MWS*	9.0	8.5	9.6	10.6	11.2	10.1	9.6	9.0	10.9	10.6	10.0	9.0
	MMWS*	32.2	27.6	30.1	34.0	35.1	33.6	33.3	32.0	32.7	33.5	34.3	33.0
Lac La Biche A	MWS	6.5	6.6	6.9	7.6	7.5	7.1	6.5	6.1	7.6	8.1	7.6	6.8
	MMWS	27.5	24.1	23.9	27.8	27.3	25.1	25.6	25.3	29.6	26.2	28.6	26.6

*MWS Mean wind speed in miles per hour.

*MMWS Mean maximum wind speed in miles per hour.

Source: Canada, Department of Transport, Meteorological Branch, Monthly Records: Meteorological Observations in Canada, 1955 to 1964 inclusive issues. Compilations courtesy of Professor R. W. Longley of the Department of Geography, University of Alberta.

TABLE XIV

JULY WIND SPEEDS DURING SELECTED DAYLIGHT HOURS AT
LAC LA BICHE (1944-68) AND COLD LAKE (1954-68)

Location	Type of summary	0500h* m.p.h. 39 and over	13-38	1-12	calm	1100h m.p.h. 39 and over	13-38	1-12	calm	1700h m.p.h. 39 and over	13-38	1-12	calm
Cold Lake	T*	0	53	324	87	0	164	275	26	0	175	282	8
	M*	0.0	3.5	21.6	5.8	0.0	10.9	18.3	1.7	0.0	11.7	18.8	0.5
Lac La Biche	T	0	72	554	148	0	129	618	28	1	148	597	29
	M	0.0	2.9	22.2	5.9	0.0	5.2	24.7	1.1	0.0	5.9	23.9	1.2

*Readings taken Mountain Standard Time.

*T -- Total number of days for the entire period during which weather station has recorded wind speed. Lac La Biche for period 1944-68; Cold Lake, 1954-68.

*M -- Arithmetic mean in days.

Source: Canada, Department of Transport, Meteorological Branch, Monthly Records: Meteorological Observations in Canada, July issues for years 1944 to 1968 inclusive.

calmest at 0500h and the least calm at 1700h. Very rarely are there wind speeds of 39 m.p.h. or over. Wind speeds between 13 and 38 m.p.h. inclusive occur quite frequently, especially late in the morning and during the afternoon. It should be noted that there are almost twice as many mean days recorded at the 13-38 m.p.h. category at Cold Lake as at Lac La Biche at 1100h and 1700h. This would indicate that Cold Lake is windier than Lac La Biche. Thus, on the basis of this evidence, it would seem that Lac La Biche has more favorable wind speeds for the use of the lakes for recreational purposes. Nevertheless, both stations record a majority of days with wind speeds between 1-12 m.p.h. inclusive and such wind conditions are far from prohibitive to the recreational use of lakes.

An analysis of the wind directions for the selected daylight hours of 0500h, 1100h, and 1700h for the month of July at Lac La Biche shows that the prevailing winds are from the northwest and west (Table XV). In the early morning hours (0500h) winds from the south and southeast are common. Southeast winds are quite common even at 1100h and 1700h. North winds also become very important later in the mornings and afternoons. The least common winds for all daylight hours are from the east, northeast, and southwest. Direct south winds are not very common during the later morning and afternoon hours.

At Cold Lake, on the other hand, the west wind too is very frequent but unlike Lac La Biche the southwest wind is the next most prevalent wind. In the early morning hours an east wind is quite common but is replaced

TABLE XV

JULY WIND DIRECTIONS DURING SELECTED DAYLIGHT HOURS AT LAC LA BICHE (1944-68) AND COLD LAKE (1954-68)

Location	Type of summary	0500h* C*	N	NE	E	SE	S	SW	W	NW
Cold Lake	T*	87	19	20	73	37	25	83	77	43
	M*	5.8	1.3	1.3	4.9	2.5	1.7	5.5	5.1	2.9
Lac La Biche	T	148	54	28	29	115	122	61	122	95
	M	5.9	2.2	1.1	1.2	4.6	4.9	2.4	4.9	3.8

		1100h C	N	NE	E	SE	S	SW	W	NW
Cold Lake	T*	26	37	25	53	54	34	68	111	57
	M*	1.7	2.5	1.7	3.5	3.6	2.3	4.5	7.4	3.8
Lac La Biche	T	28	114	53	62	96	69	85	116	152
	M	1.1	4.6	2.1	2.5	3.8	2.8	3.4	4.6	6.1

		1700h C	N	NE	E	SE	S	SW	W	NW
Cold Lake	T*	8	44	33	56	48	31	61	122	62
	M*	0.5	2.9	2.2	3.7	3.2	2.1	4.1	8.1	4.1
Lac La Biche	T	29	86	52	50	96	65	66	161	170
	M	1.2	3.4	2.1	2.0	3.8	2.6	2.6	6.4	6.8

*Readings taken Mountain Standard Time *C -- Calm

*T -- Total number of days for the entire period during which weather station has recorded wind direction. Lac La Biche for period 1944-68, Cold Lake 1954-68.

*M -- Arithmetic mean in days per month.

Source: Canada, Department of Transport, Meteorological Branch, Monthly Records: Meteorological Observations in Canada, July issues for years 1944 to 1968 inclusive.

in frequency of occurrence by the northwest wind in the later morning and afternoon hours. The least common wind direction is from the northeast. Southerly and northerly winds also occur very infrequently. Days with calm are very infrequent at both stations in the late morning and afternoon periods. Both lakes have calm conditions in the early morning.

It can be seen that as far as wind direction is concerned, local microclimatic factors must have a strong influence. Thus it is difficult to generalize climatically for all the lakes in the region. It would appear, however, that northeast winds certainly are not very common. The west wind, on the other hand, appears to be very common. Wind data such as these become very important for recreational purposes when beaches are evaluated for their recreational potential and moreso when potential sites are being evaluated for development as campgrounds, parks, summer resorts or lake-side cottages. Thus beaches facing northeast would most likely be least troubled by rough water whereas west facing exposed beaches or shorelands would be plagued very frequently by onshore winds and whatever conditions they bring.

Useful in assessing the general climate of the region are the mean relative humidities for the months of January and July for the weather stations at Cold Lake and Lac La Biche. From Table XVI it can be seen that in January, the relative humidity both during the day and during the night, is quite high--around 80 per cent. In July, however, the relative humidity is quite high during the night (between 85 and 90 per cent), but drops to between 50 and 55

per cent during the day. Thus in summer during the day, when the temperatures are the highest, the relative humidities are relatively low for the season. In terms of physiological comfort, this is advantageous as high temperatures and dry air are less discomforting than high temperatures and very humid air.

TABLE XVI

MEAN RELATIVE HUMIDITIES FOR JANUARY AND JULY AT LAC LA BICHE (1944-68) AND COLD LAKE (1955-68)

Location	January		July	
	RH(high)*	RH(low)	RH(high)	RH(low)
Cold Lake	79.2%	74.7%	86.7%	51.1%
Lac La Biche	85.6%	80.4%	88.6%	54.7%

*RH(high) - The mean of the highest recorded relative humidities for each day of the month.

Source: Canada, Department of Transport, Meteorological Branch, Monthly Records: Meteorological Observations in Canada, 1944 to 1968 inclusive issues.

Bioclimatic effects on man. Since man is the central element in recreational enjoyment, it is only fitting to look at the above climate from the standpoint of his comfort. Werner H. Terjung in a 1966 study stated that:

> a survey of the existing literature reveals a certain lack of interest in actual classifications and maps centered upon the feeling of man in regard to climate, incorporating

> the major elements affecting him, air temperature, water vapor pressure, wind speed, and solar radiation.[13]

Though there has been little work in devising universal climatic classifications based on man, a number of investigators have ". . . endeavoured to express the effects of climatic parameters upon human comfort by means of certain expressions."[14] These expressions have taken the form of various comfort indices. For example, the American Society of Heating and Ventilating Engineers, whose field is in indoor microclimates, have long devised a comfort index which is an accepted measurement of human comfort in relation to the combined effects of air temperature and humidity.[15] Terjung incorporated a number of these comfort indices and developed a classification of climatic environments based upon measurable human physiological and psychological reactions.

The major climatic elements taken into account by the Terjung system are: temperature maxima and minima, humidities, radiation, and air movement. Terjung also plotted two classification nomograms: the Comfort Index and Wind Effect Index. As shown by Figure 2 the Comfort Index nomogram consists of levels of comfort based on an integration of dry-bulb and

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[13]Werner H. Terjung, "Physiologic Climates of the Conterminous United States: A Bioclimatic Classification Based on Man," Annals of the Association of American Geographers, Vol. 56, No. 1, March, 1966, p. 143.

[14]John F. Griffiths, Applied Climatology: An Introduction. Oxford University Press, London, 1966, p. 74.

[15]Terjung, op. cit., p. 147.

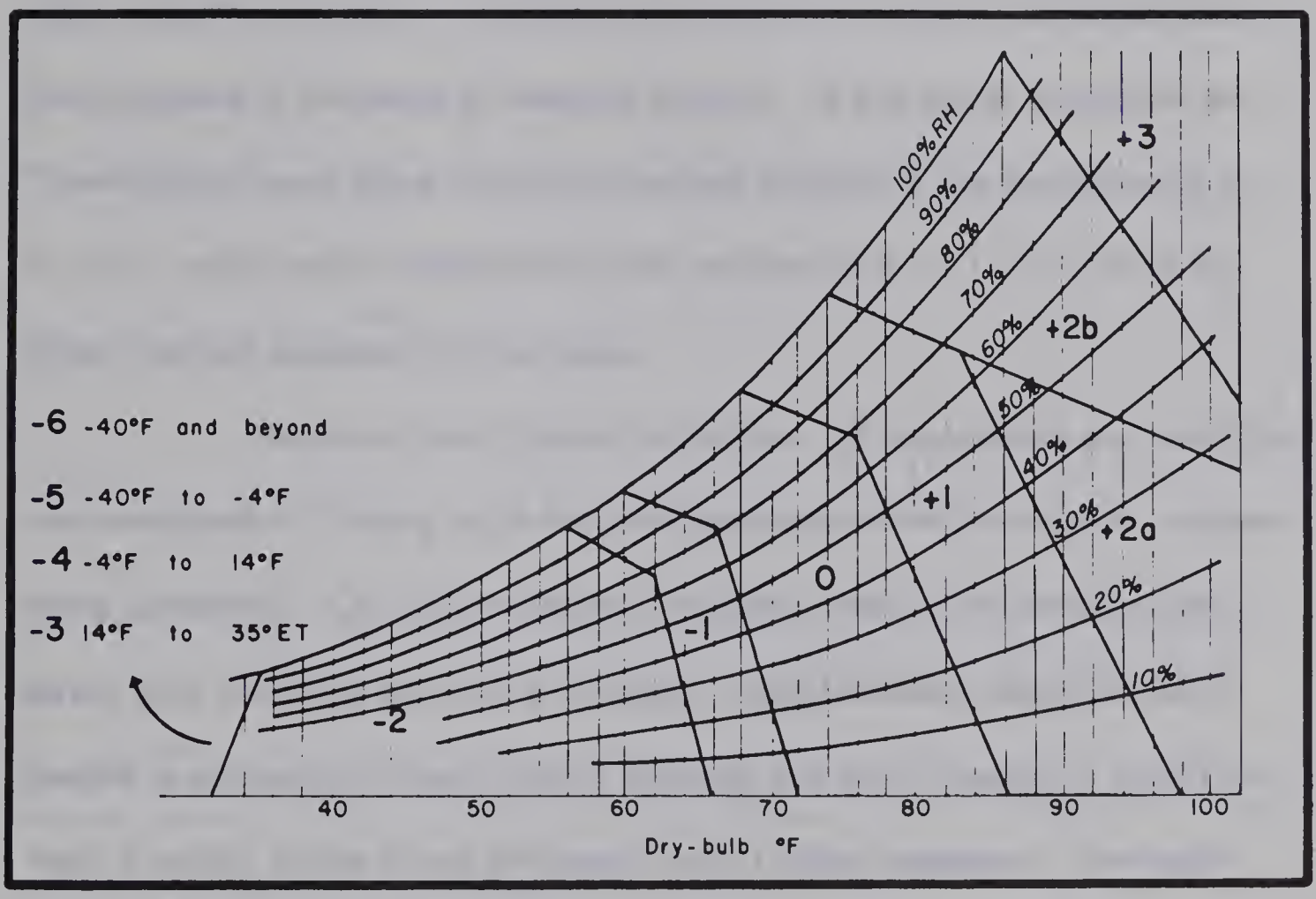


Figure 2 Comfort Index Nomogram.

From: Werner H. Terjung, "Physiologic Climates of The Conterminous United States : A Bioclimatic Classification Based On Man," Annals of the Association of American Geographers, Vol. 56, No.1, March, 1966, p. 148



wet-bulb temperatures in calm air and in the shade or indoors. For example, the portion of the nomogram designated by the symbol 0 and the term "comfortable" is considered the average comfort zone during the year for a large majority of persons. The limits of this zone have been determined from the judgments of thousands of research subjects. If one moves away from the "comfortable" zone either toward the warmer sections of the continuum (e.g., +1, +2a, and so on) or toward the colder sections (e.g., -1, -2, and so on) human comfort progressively decreases.

The above two climatic conditions, air temperature and humidity, are considered by Terjung to be the most important as they impinge on a human being constantly. On many occasions, however, there is air movement and direct solar radiation and thus a secondary, complementary classification is needed to account for these climatic elements and their consequent modification, if at all, of the above discussed Comfort Index nomogram. The resulting Wind Effect Index nomogram (Figure 3) is based on the cooling of the skin taking place at certain temperatures by the wind. Cooling by wind or "wind chill" is defined as

> '. . . the measure of the quantity of heat which the atmosphere is capable of absorbing within an hour from an exposed surface one meter square.' . . . [The] quantity of heat transferred is expressed in Kcal/m^2hr.[16]

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[16] Ibid., p. 149.

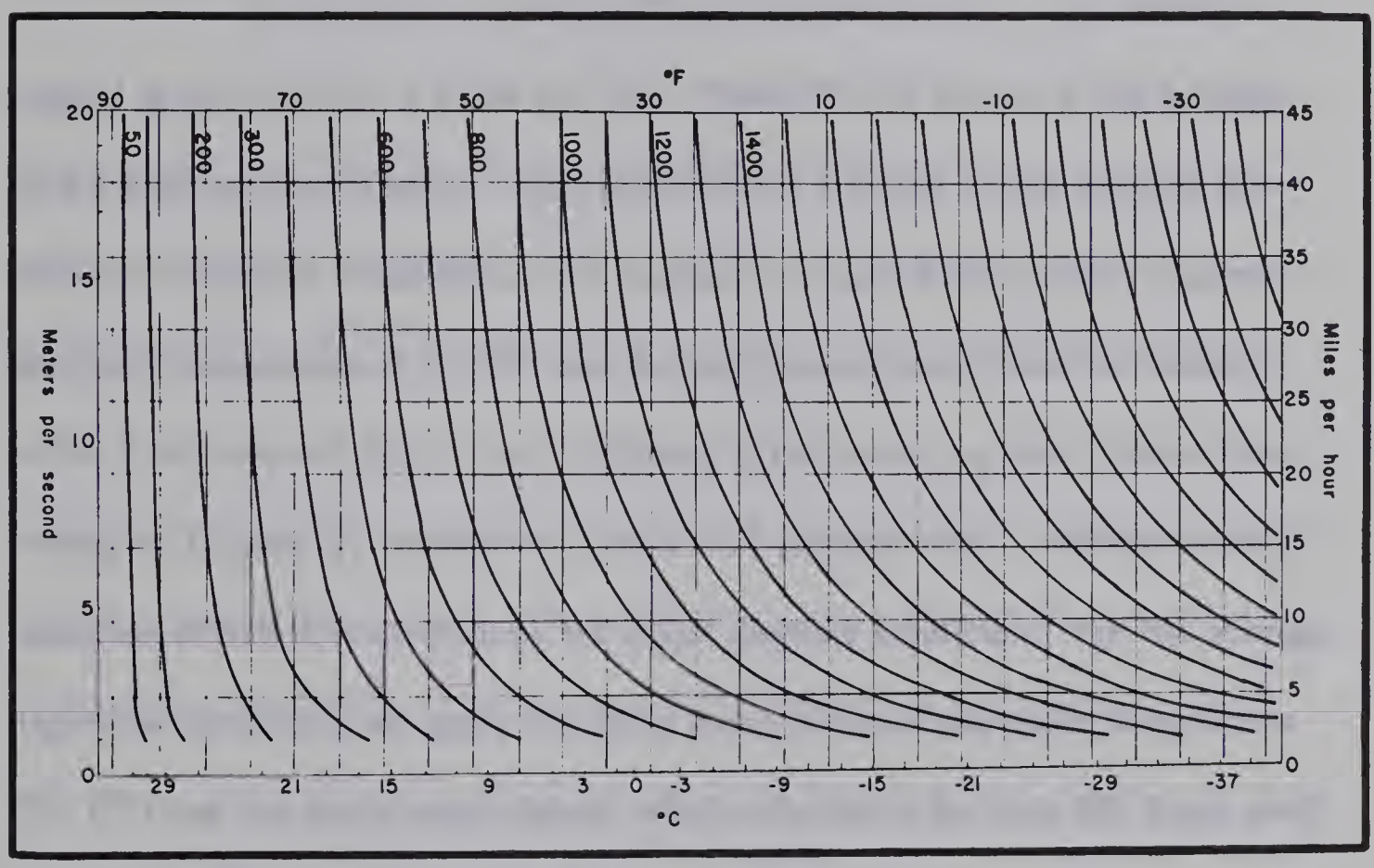


Figure 3 Wind Effect Index Nomogram

From: Werner H. Terjung, "Physiologic Climates of The Conterminous United States : A Bioclimatic Classification Based On Man," Annals of the Association of American Geographers, Vol. 56, No.1, March, 1966, p. 151.



The counteracting force against wind chill is solar radiation which reduces the wind chill by about 200 Kcal/m^2hr every hour of bright sunshine.[17]

An example of the application of the indices to the meteorological data from Lac La Biche for July, 1944-68 will illustrate the function of the indices more clearly. The classification is based on the average daytime and nighttime conditions. For example, using the daily mean maximum dry-bulb temperature of 73.4°F and the daily mean lowest relative humidity of 54.7 per cent for July at Lac La Biche, after consulting the Comfort Index nomogram (Figure 2), we derive a value of 0 (comfortable). Without wind or radiation effects this constitutes the major daytime condition. For the average nighttime conditions we apply the daily mean minimum dry-bulb temperature (51.1°F) and the daily mean highest relative humidity for July (88.6 per cent) to Figure 2 and derive a value of -2 (keen). The two Comfort Indices for day and night are combined 0/-2 or termed comfortable/keen. This expression is referred to as the Comfort Index. Consulting conversion Tables provided in Appendix A, this combination can be symbolically expressed as M_3.

We now determine via the Wind Effect Index nomogram how many, if any, Kcal/m^2hr are being removed (cooled or chilled) from a square meter of human skin in one hour. For the nighttime conditions for July at

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[17] Ibid., p. 153.

Lac La Biche we apply the mean hourly wind speed in miles per hour for the month of July (6.4 m.p.h.) and the mean daily minimum temperature (51.1°F) to Figure 3. The resulting value is -550 Kcal/m^2hr. From Appendix A the symbolization is -c which is termed cool wind chill.

Daylight conditions require one further step to derive a comparable value. The first step is identical to the above except using the mean daily maximum dry-bulb temperature (73.4°F). The resulting value is -250Kcal/m^2hr. This value is next multiplied by the mean daily number of hours of possible sunshine for July at Lac La Biche, i.e., -250 Kcal/m^2hr by 16.63 hours, resulting in -4158 Kcal/m^2hr. Then the hours of actual sunshine are derived from mean cloudiness data. Mean cloudiness is the mean amount of cloudiness for 0500h, 1100h, and 1700h for July at Lac La Biche (59.6 per cent). From this value (59.6 per cent) the percentage of actual sunshine is derived--40.4 per cent. One then takes 40.4 per cent of the mean daily number of hours of possible sunshine for July (16.63 hours) and derives 6.72 hours of actual sunshine. Then the wind-retarding factor under bright sunshine (200 Kcal/m^2hr) is multiplied by the hours of actual sunshine (6.72 hours). This resulting value (+1344 Kcal/m^2hr) is applied against the average wind chill factor (-4158 Kcal/m^2hr) during hours of possible sunshine. The difference between the two values (-2814 Kcal/m^2hr) is divided by the hours of possible sunshine (16.63), in order to derive an hourly rate comparable to the night rate. This daytime hourly value is -169 Kcal/m^2hr or -a, termed

warm wind effects. The two Wind Effect Indices for day and night are combined -169/-550 (-a/-c), or termed warm wind effects/cool wind chill. Referring to Appendix A this combination can be expressed as $-a_3$.

In its final form Terjung's classification for Lac La Biche for the month of July would appear as M_3-a_3, which is translated as: mild climate having comfortable days with warm wind effects and keen nights with a cool wind chill. The entire expression would refer to sensations the majority of the people would experience on the average day and night at Lac La Biche in July.[18]

The most comfortable physiological climate according to Terjung is M_1-a_3 which is translated as: a mild climate having comfortable days with warm wind effects and comfortable nights with a cool wind chill.

Since Terjung's system incorporates the latest studies of human comfort it was decided to use his formula in this study. The calculations first described were made for July for Cold Lake and for January for Lac La Biche and Cold Lake from meteorological data available for the two weather stations.[19] It is assumed that the data for these stations are reasonably representative of the region as a whole.

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[18]Ibid., p. 157

[19]All data used include the months of January and July, 1968, and are taken primarily from: Canada, Department of Transport, Meteorological Branch, Monthly Records: Meteorological Observations in Canada, January and July issues for the years 1944 to 1968 inclusive. Hours of possible sunshine were derived from: Nautical Almanac Office, United States Naval Observatory, The Nautical Almanac for the Year 1969. U.S. Printing Office, Washington, D.C., 1967, 311 pp.

The January values for both Lac La Biche and Cold Lake are almost the same. Lac La Biche has a classification of VC_2-f_2 or: very cold climate having very cold days with a very cold wind chill and extremely cold nights with a bitterly cold wind chill. Cold Lake, on the other hand, has a classification of VC_2-f_3. The difference between Lac La Biche and Cold Lake lies in the more severe wind effect during the night which would result in the freezing of exposed flesh at the latter station.

For July, however, the wind effects are different both during the day and night. The symbol for Lac La Biche as stated above is M_3-a_3, or: mild climate having comfortable days with warm wind effects and keen nights with a cool wind chill. For Cold Lake the evaluation is M_3-b_3, or: mild climate having comfortable days with pleasant wind effects and keen nights with a very cool wind chill. Thus, the wind factor at Lac La Biche is ideal as far as human comfort is concerned. At Cold Lake, however, the factor is a little more discomforting than at Lac La Biche. It might be noted that if it were not for the quite cool nights Lac La Biche would have in July a most comfortable physiological climate (M_1-a_3).

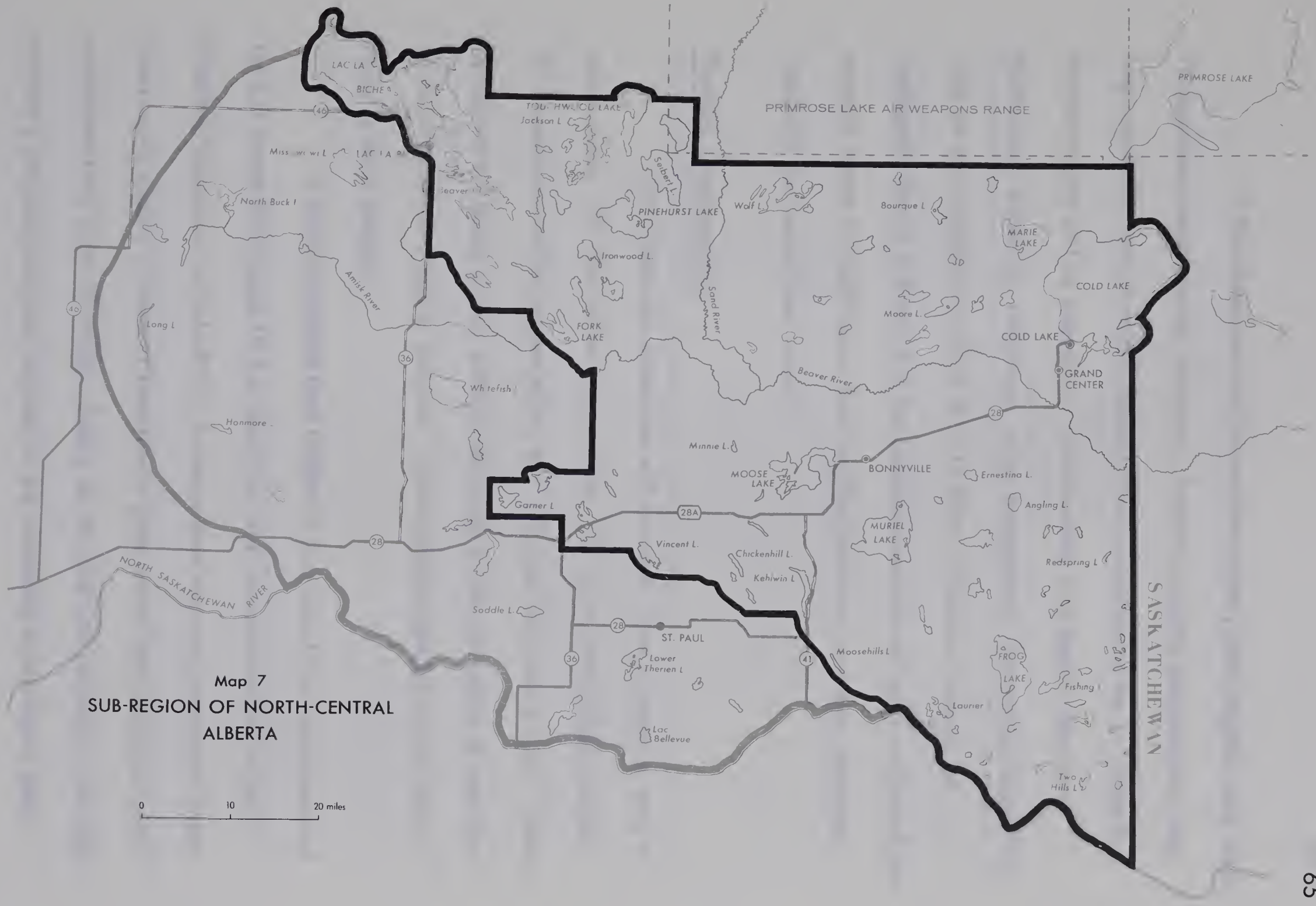
Thus, climatically for man the region offers two extremes. During the winter for both places the climate is very cold and far from ideal. Climatic hindrance to outdoor recreational use is then very pronounced. On the other hand, the summer climate is much more tolerable for man. Outdoor recreational use can be conducted with only slight discomfort.

It may be concluded that the region possesses many of the environmental attributes that are of importance to recreation. The climate during the summer is pleasant and places no unbearable discomfort on human beings. The geomorphic history has resulted in a landscape that provides lakes in depressions and much sand along beaches. Where non arable soils occur there is a coincidence with the greatest number of lakes of varying potential. Though some of the agricultural practices hinder recreation, e.g., clearing trees along lake shores, in many respects, present agricultural use of the land enhances what in most cases under natural vegetation, would be a monotonous landscape. Thus, this sparsely settled area with its large number of lakes and warm, summer climate would appear to be highly suitable for outdoor recreational use.

CHAPTER III

PHYSICAL DESCRIPTION AND RECREATIONAL CAPABILITY OF THE LAKES IN THE SUB-REGION

Since the choice in use of the lakes of the region is dependent on their physical setting in the environment, as well as on a number of inherent characteristics of each lake itself, it is worthwhile here to analyze the characteristics of the lakes themselves from the point of view of the potential recreational user. Field work time allowed the mapping of the shoreland capabilities of approximately only half of the lakes in the whole region. Map 7 shows the area for which this detailed mapping of the lake shoreland capabilities was done. This area shall henceforth be known as the sub-region. One hundred and eleven lakes in this sub-region were selected because of their suitability for family boating thus meeting the requirement for the shoreland designation of the CLI land capability classification for outdoor recreation. The names, total region or region, and sub-region when used in the remainder of this study will apply respectively to the total study area (total region or region) and to the sub-region for which the shoreland capability classification was mapped.



Map 7
SUB-REGION OF NORTH-CENTRAL ALBERTA

0 10 20 miles



In the discussion that follows the number, size, depths, lake level fluctuations, water quality, break-up, freeze-up, water temperatures, angling capability, and shoreland capability for recreation of the 111 lakes in the sub-region will be examined. Unfortunately lake depth, lake level fluctuation, break-up, freeze-up, water temperature, and angling capability data are not available for all of the 111 lakes. However, despite the inadequate data it is hoped that the following analysis will give an idea of the physical nature of these lakes, their angling potential, and their shoreland capability for recreational activity.

Physical Characteristics

Four lake-size categories will be used. Size is based on area in square miles: (1) five or less square miles, (2) six to twenty square miles, (3) twenty-one to fifty square miles, and (4) over fifty square miles. These categories are based on four evident lake sizes in the sub-region as seen from an examination of a map of the area. The following table groups the lakes found in each category.

It will be recalled from Chapter I that one of the requirements of the CLI system for a Class 1B is a lake of at least six square miles in size. From the tabulation in Table XVII, it can be seen that only fourteen of these lakes would qualify in terms of lake size to have one of their shoreland units considered for a Class 1B rating. Solely on the lake size limitation, the highest that a shoreland unit can be rated on the remaining ninety-seven lakes

is a Class 2. Information gathered from the use survey suggests that a reclassification seems in order.

TABLE XVII

LAKE SIZES

Category	Areal extent in square miles	Lakes	Number of lakes
4	> 50	Cold, Lac La Biche	2
3	21-50	Frog, Muriel	2
2	6-20	Beaver, Fork, Marie, Moose, Pinehurst, Reita, Seibert, Spencer, Touchwood, Wolf	10
1	<6	Remaining lakes	97

Lake depths vary from very shallow waterfowl lakes to very deep lakes. Not every lake in the region has been surveyed for depth. Depth information is given for only twenty-one of the lakes. For fifteen of those lakes, the maximum depths can be obtained only from underwater contour maps and thus are within an accuracy of five or ten feet. The maximum depths for these fifteen lakes are shown in Table XVIII.

The known maximum depths for the remaining six lakes are shown in Table XIX.

For lake level fluctuations data are available for some of the lakes as well. Lake level fluctuations during the spring and summer months for any one year are generally very slight. For example, Table XX illustrates for the

TABLE XVIII

MAXIMUM DEPTHS FOR LAKES FOR WHICH ONLY UNDERWATER CONTOUR MAPS AVAILABLE *

Lake	Depth in feet	Lake	Depth in feet
Lower Mann	20-25	Garner	50-55
Laurier	25-30	Floatingstone	65-70
Upper Mann	30-35	Moose	65-70
Vincent	30-35	Lac La Biche	70-75
Kehiwin	35-40	Marie	85-90
Muriel	35-40	Moore	85-90
Beaver	50-55	Touchwood	130-140
Fork	50-55		

*Alberta Department of Agriculture, Water Resources Division, Hydrographic Surveys, 1969.

period May 15 to September 12, 1968, the fluctuations recorded for a number of the lakes in the sub-region.

TABLE XIX

LAKES WITH KNOWN MAXIMUM DEPTHS

Lake	Depth in feet	Lake	Depth in feet
Whitney	36*	Pinehurst	77**
Ross	37*	Wolf	115***
Elinor	39*	Cold	395****

*R. B. Miller, and M. J. Paetz, Preliminary Biological Surveys of Alberta Watersheds, 1950-1952, Vol. II. Alberta Department of Lands and Forests, 1953, pp. 59, 107.

**Survey carried out by Dennis McDonald, Alberta Department of Lands and Forests, Fish and Wildlife Division, 1964.

***Personal communication with personnel in Alberta Department of Lands and Forests, 1969.

****Personal communication with Mike R. Robertson, Regional Fishery Biologist, St. Paul, Alberta, Department of Lands and Forests, Fish and Wildlife Division, March, 1969.

TABLE XX

SOME LAKE LEVEL FLUCTUATIONS FOR PERIOD
MAY 15 - SEPTEMBER 12, 1968*

Lake	Fluctuation in feet	Lake	Fluctuation in feet
Mann Lakes	0.24	Garner	0.45
Vincent	0.35	Moose	0.60
Kehiwin	0.40	Floatingstone	2.48
Muriel	0.40		

*Alberta Department of Agriculture, Water Resources Division, Hydrographic Surveys, 1969.

For Cold Lake and Lac La Biche during the period May to September, 1965, the fluctuations observed were 2.62 and 1.65 feet respectively.[1] Lake level fluctuation over a period of years too, is not very great.[2] For example, at Cold Lake for the period of record October 1954 to September 1965, the difference between the extremes recorded is 4.22 feet.[3] Lac La Biche on the other hand showed a fluctuation of 6.85 feet for the period of record 1930 to 1965.[4]

Data for break-up and freeze-up are available for only Cold Lake and Lac La Biche. It is apparent that most data have been collected for these two lakes, perhaps because they are the largest in the whole region. For Cold Lake the mean date (1941-1963) for complete break-up, when the body of water is first observed to be entirely clear of ice, and remains clear thereafter, is May 17.[5] The earliest recorded date was May 4, 1944 and the latest date for complete break-up was May 26, 1953. The mean date (1952-1963) for

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[1]Canada, Department of Energy, Mines and Resources, Inland Waters Branch, Surface Water Data, Alberta, Water Year 1965. Queen's Printer and Controller of Stationery, Ottawa, 1967, pp. 38, 57.

[2]All months of the year are used for calculation, not just spring and summer months.

[3]Canada, Department of Energy, Mines and Resources, Inland Waters Branch, op. cit., p. 57.

[4]Ibid., p. 38.

[5]Canada, Department of Transport, Meteorological Branch, W.T.R. Allen, Break-up and Freeze-up Dates in Canada, Cir. 4116, October, 1964, pp. 43, 44.

complete freeze-up, when the water is completely frozen over, for Cold Lake is December 21. November 27, 1954 was the earliest recorded date for complete freeze-up, and December 29, 1957 and 1962 were the recorded dates for latest complete freeze-up.

In the case of Lac La Biche the mean date (1946-1963) for complete break-up is May 13.[6] The earliest date recorded for complete break-up was April 30, 1946 and the latest, May 25, 1954. The mean date (1945-1963) for complete freeze-up for Lac La Biche is November 17. The earliest recorded complete freeze-up was October 28, 1951 and the latest November 30, 1949.

It should be noted that Cold Lake and Lac La Biche are the largest lakes and Cold Lake the deepest. Their break-up and freeze-up dates are not likely to coincide with those of the smaller lakes or even with each other, since the smaller and shallower lakes will tend to freeze earlier and break up earlier.[7] The lakes, other than Cold Lake, are eutrophic and the majority undergo some degree of water stagnation in the deeper areas during both summer and winter. During the summer, regardless of the depths of the lakes, surface water temperatures usually approach the 68°F level.[8] Cold Lake, an oligotrophic lake, is colder than all the other lakes. For example, on July

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[6] Ibid., p. 99.

[7] Ibid., p. 4

[8] Personal communication with Mike R. Robertson, Regional Fishery Biologist, St. Paul, Alberta, Department of Lands and Forests, Fish and Wildlife Division, March, 1969.

21, 1959, water temperatures shown in Table XXI were recorded off the southeast shore of Cold Lake.[9]

TABLE XXI

COLD LAKE WATER TEMPERATURES ON JULY 21, 1959

Depth (in feet)	surface	10	20	40	60	80	100	120	140
Temperature (°F)	66.7	64.4	55.2	48.0	45.5	43.7	42.8	41.9	41.5

On this day the wind directions recorded at the Cold Lake weather station for selected hours were as follows: (1) east-southeast at 800h, (2) southwest at 1100h, (3) south-southeast at 1400h, and (4) east at 1700h.[10] One day earlier on shallower Moose Lake the water temperatures were as shown in Table XXII.[11]

TABLE XXII

MOOSE LAKE WATER TEMPERATURES ON JULY 20, 1959

Depth (in feet)	surface	10	20	40
Temperature (°F)	74.7	70.3	66.9	58.1

[9]Temperatures obtained from field book of John I. Doonanco, Fish and Wildlife Supervisor, St. Paul, Alberta.

[10]Canada, Department of Transport, Meteorological Branch, Edmonton International Airport Weather Office, May, 1969.

[11]Field book of John I. Doonanco, op., cit.

It is obvious from these values that even at a depth of forty feet, Moose Lake was 10°F warmer than Cold Lake.

The United States Forest Service recommends lake water temperatures not below 68°F for swimming.[12] Though the Forest Service does not specify it is assumed they mean surface water temperatures. Much lower temperatures would be acceptable for boating. However, the Forest Service does caution that "the temperature at which swimming and/or boating become marginal should be established on a regional or local basis."[13] This is obvious but it does establish a minimal value for water temperatures which may be tolerated by recreationists in any numbers. Thus, the lakes in the region, with the possible exception of Cold Lake, would have summer water temperatures suitable for swimming and boating. The temperature at Cold Lake with its very cold sub-surface water could be more critical when mixing of the waters occurs as a result of wind action. However, the author observed during July and August of 1967 considerable use of Cold Lake by bathers, swimmers and boaters.

Many beaches along the lake shore have their quality lowered by winds moving algae and other debris onto them. Numerous lakes suffer from algal bloom in late summer. The more western and southern lakes seem to be

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[12]U. S. Department of Agriculture, Forest Service, Work Plan for the National Forest Recreation Survey--A Review of the Outdoor Recreation Resources of the National Forests. Washington, 1959, pp. 84, 85.

[13]Ibid., p. 85.

most affected and the more northern and eastern less affected. Those lakes with little or no algal problem are: Cold, Ethel, Fork, Frog, Hilda, Marie, Moore, Muriel, Pinehurst, Seibert, Touchwood, and Wolf Lakes. On the other hand, Lac La Biche, Lower Mann, Upper Mann, Moose, and Manatokan Lakes during the summer of 1967, were observed to have a serious algal bloom incidence. Why it should be that the northern and eastern lakes have a less serious algal problem is not certain. One possible explanation may be the over-enrichment of the southern and western lakes with fertilizer run-off from the surrounding agricultural land.[14] Agricultural land use is much more prevalent around the southern and western lakes than around the northern and eastern lakes. However, other factors such as soft and oozy lake bottoms, shallowness, no inlets or outlets, earlier spring run-off, water balance of the area, could be significant but until a definitive study is done it can only be speculated as to the cause of this areal differentiation in the incidence of algae in the lakes.[15]

Swimmers' itch (cercarial or schistosome dermatitis) too, is a problem in some of the lakes. Swimmers' itch is caused by the penetration of the skin of man by microscopic larvae of several species of schistosome worms

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[14]Hilary Rose, "Sinister effect of fertilizer," Science Journal, Vol. 4, No. 3, March, 1968, pp. 86, 87, and "Sweetening the land sours the lakes," Science Journal, Vol. 4, No. 5, May, 1968, pp. 9, 11.

[15]Personal communication with Dr. L. L. Kennedy, Department of Botany, and Dr. A. H. Laycock, Department of Geography, University of Alberta, Edmonton, Alberta, May, 1969.

that are parasites of waterfowl and, possibly also of muskrats and certain other mammals.[16] The larvae do not enter the blood stream of man, but they do burrow into the skin and die. "The result is an acute irritative or inflammatory reaction--'swimmers' itch."[17] An example of a lake which is very intensively used for its size and which has a very serious swimmers' itch problem is Whitney Lake. Lac La Biche occasionally is reported to have this problem.

Angling Capability

Angling capability according to the CLI system is assessed for sixty-five of the 111 lakes. Information on angling capability and existing species for 53 of the 65 lakes was provided by the regional fishery biologist, Mike R. Robertson.[18]

Robertson classified the fifty-three lakes as: good to excellent (G-E), good (G), medium (M), poor (P). This classification is based on his knowledge of the fish species involved, their size and number, and the amount of use of the lake for angling. A species category was also included as shown in Table XXIII.

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[16]Saul Jarcho and Anastasia Van Burkalow, "A Geographical Study of 'Swimmers' Itch' in the United States and Canada," Geographical Review, Vol. 42, No. 2, April, 1952, pp. 213, 214.

[17]Ibid., p. 214.

[18]Personal communication with M. R. Robertson, Regional Fishery Biologist, St. Paul, Alberta, Department of Lands and Forests, Fish and Wildlife Division, March, 1969.

TABLE XXIII

ROBERTSON'S FISH SPECIES CATEGORIES

Symbol	Species indicated by symbol
1	Pike, perch
2	Pike, perch, walleye
3	Pike, perch, walleye, whitefish
4	Pike, perch, walleye, whitefish, laketrout

Source: Mike R. Robertson, Regional Fishery Biologist, St. Paul, Alberta, Department of Lands and Forests, Fish and Wildlife Division, March, 1969.

On this basis his lakes were differentiated as shown in Table XXIV.

TABLE XXIV

ANGLING CAPABILITY OF FIFTY-THREE LAKES IN SUB-REGION

Angling Capability	Number of lakes	Lake(s)
GE2	1	Kehiwin
GE3	4	Moose, Pinehurst, Seibert, Wolf
GE4	2	Cold, Touchwood
G1	5	Angling, Bentley, Long, Thompson Lakes, Whitney
G2	11	Bangs, Chickenhill, Fishing, Fork, Garner, Laurier, May, Minnie, Reita, Upper Mann, Vincent

TABLE XXIV (continued)

Angling Capability	Number of lakes	Lake(s)
G3	16	Beaver, Blackett, Elinor, Ethel, Floatingstone, Frenchman, Helena, Hilda, Ironwood, Jackson, Kinnaird, Moore, Muriel, Spencer, Square, Tucker
M1	7	Beartrap, Bourque, Lower Mann, Moosehills, Ross, Soars, Thin
M2	2	Ernestina, Manatokan
M3	3	Frog, Lac La Biche, Marie
P1	1	Leming
P	1	Borden

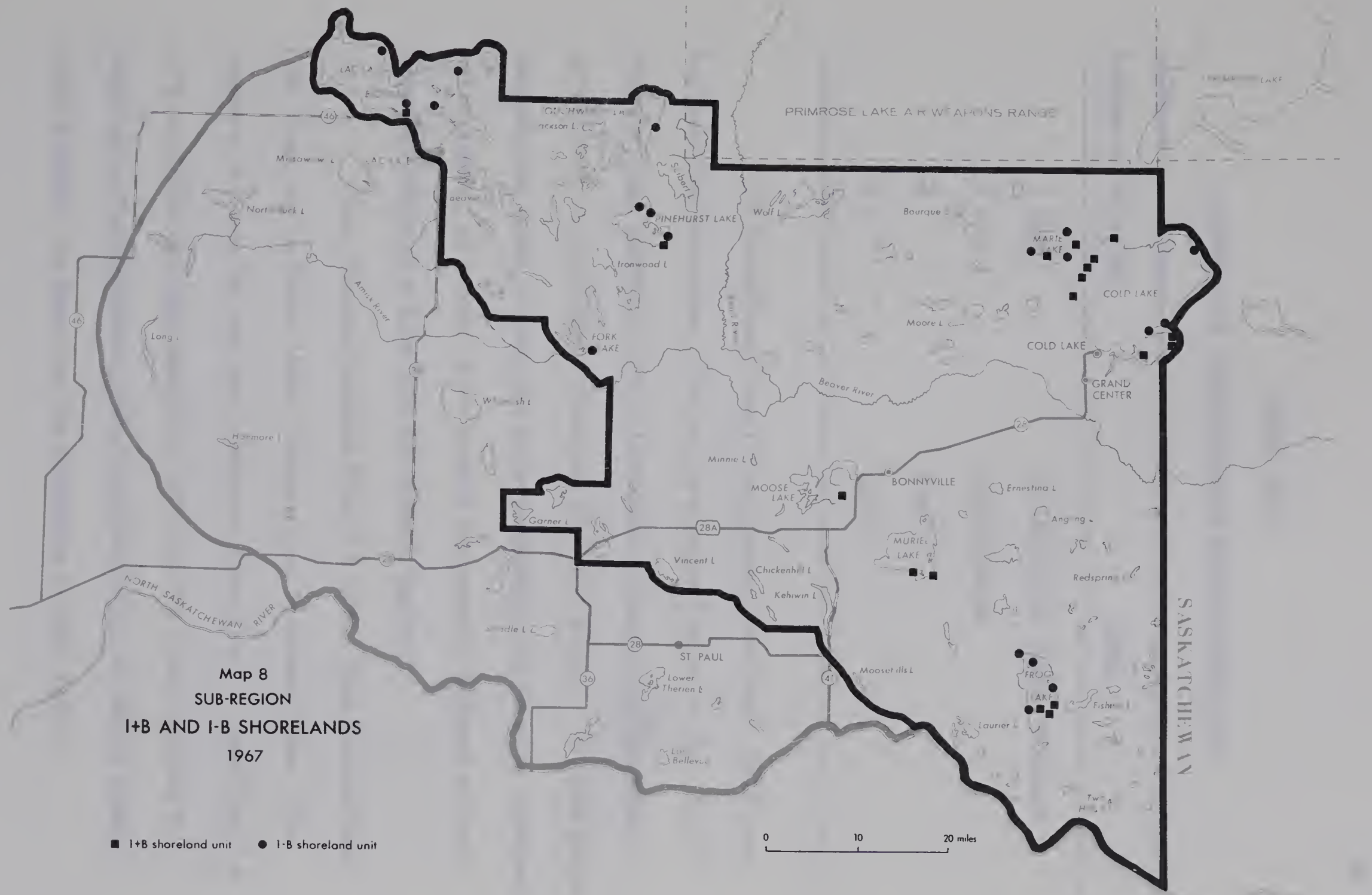
Source: Mike R. Robertson, Regional Fishery Biologist, St. Paul, Alberta, Department of Lands and Forests, Fish and Wildlife Division, March, 1969.

Robertson's classification gives seven good to excellent lakes, thirty-two good lakes, twelve medium lakes, and two poor lakes. With the high number of lakes (thirty-nine) in the top two classes (GE, G) it can be seen that the sport fishery capability of the sub-region is very high. The importance of this high sport fishery capability will become very evident later when the demand by recreational users for sport fish species in a lake will be examined.

Shoreland Inventory

On the basis of the modified criteria of the Canada Land Inventory land capability classification applied in this study, it has been possible to establish the recreational shoreland capability of the lakes in the sub-region. The basis for the modified criteria has been established above. To discuss each of the 111 lakes individually or even the thirty-seven Class 1 sites or the eighty-seven Class 2 sites individually would not be worthwhile here. Instead, the detailed map sheets have been reduced in scale and appear in Appendix B, showing the exact location, length, subclasses, and limitations of a particular shoreland unit. Aspects of the distribution shown on the map sheets will be discussed. Discussion will be limited to the recreational shoreland capability of those lakes which have units that fall into the top three capability classes. Only the first subclass in each case will be analyzed. Since only the first subclass symbol will be used in the discussion, units which have been separated on the detailed maps because of different subclasses in second or third position or different limitation symbols, will be combined and treated as one unit. For example, if two units such as 3BKY/nha, and 3BYK/neh, had been found located together on one of the maps in Appendix B, then they are combined and treated as the one unit 3B.

Class 1+B and 1-B. Map 8 illustrates the approximate locations of the Class 1+B and 1-B shoreland units. Shoreland unit ratings of 1+B occur in parts of only seven lakes and their immediate environs. Table XXV illustrates the number of 1+B units that each lake has.



Map 8
SUB-REGION
I+B AND I-B SHORELANDS
1967

■ I+B shoreland unit ● I-B shoreland unit



TABLE XXV

NUMBER OF 1+B UNITS AND LAKES FOUND ON

Number of 1+B unit(s)	Lake(s)
1 each	Lac La Biche, Moose, Pinehurst
2 each	Marie, Muriel
3	Frog
8	Cold

Of the eighteen Class 1+B units among these lakes, Cold Lake has almost half the number. This may be accounted for by its size. Six of these very high capability units on Cold Lake are located on the western, northwestern and southwestern shorelands located in Alberta. As stated earlier, the prevailing winds at Cold Lake are predominantly from the west, southwest, and northwest. As a result, these beaches are generally sheltered and on a large cool lake such as Cold Lake this factor is important.

Next, there are nineteen Class 1-B units. These involve Cold, Fork, Frog, Lac La Biche, Marie, Pinehurst, and Touchwood Lakes. The number of 1-B units for each lake is shown in Table XXVI. These Class 1-B units are still of very high capability, but unlike the Class 1+B where the beach has no limiting features, these have minor ones. In terms of Class 1 units, therefore, the lakes show the distribution in Table XXVII.

TABLE XXVI

NUMBER OF 1-B UNITS AND LAKES FOUND ON

Number of 1-B unit(s)	Lake(s)
1 each	Fork, Touchwood
2	Marie
3	Cold
4 each	Frog, Lac La Biche

TABLE XXVII

LAKES WITH CLASS 1 UNITS

Lake	Class 1+B	Class 1-B	Total
Cold	8	3	11
Frog	3	4	7
Lac La Biche	1	4	5
Marie	2	2	4
Muriel	2	0	2
Fork	0	1	1
Moose	1	0	1
Pinehurst	1	0	1
Touchwood	0	1	1

Class 2 shoreland units. There are eight-seven Class 2 shoreland units in the sub-region--see Map 9. The types and number of units are shown in Table XXVIII.

Map 9

SUB-REGION

CLASS 2 SHORELANDS

1967

■ 2+B shoreland unit ● 2-B shoreland unit ▲ 2N shoreland unit ▼ 2Y shoreland unit

0 10 20 miles



TABLE XXVIII

TYPES AND NUMBER OF CLASS 2 UNITS

Unit:	2+B	2-B	2N	2Y
Number:	23	55	10	9

It will be recalled that N is land suited to family cottage or other recreational lodging use and Y is shoreland adjacent to water suitable for popular forms of family boating activity.

Class 2+B units are found on nine lakes: Beaver, Cold, Frog, Lac La Biche, Laurier, Long, Muriel, Square, and Wolf. The number of units that each lake has is shown in Table XXIX.

TABLE XXIX

NUMBER OF 2+B UNITS AND LAKES FOUND ON

Number of 2+B Units	Lakes
1 each	Beaver, Laurier, Long, Square
2	Wolf
4 each	Cold, Frog, Muriel
5	Lac La Biche

The Class 2-B units are located on twenty-six different lakes scattered throughout the sub-region as shown in Table XXX.

TABLE XXX

NUMBER OF CLASS 2-B UNITS AND LAKES FOUND ON

Number of 2-B unit(s)	Lake(s)
1 each	Angling, Beaver, Ethel, Floatingstone, Garner, Little Rock Island, Manatokan, Marie, Moose, Muriel, Spencer, Vincent, Whitney, Wolf, lake north of Bluet Lake
2 each	Beartrap, Fishing, Laurier, Moore, Pinehurst
3 each	Frenchman, Ironwood, Touchwood
6	Frog
7	Lac La Biche
8	Cold

Most of the smaller lakes which do not have the water area to support the overall intensity of use required for Class 1B sites but which do have good quality beaches now appear with shoreland units in the Class 2 capability rating.

The ten Class 2N units are found on the shorelands of four lakes--Marie, Ironwood, Wolf, and Cold. According to the CLI system, in terms of intensity of use, Class 2 is the highest at which a lodging unit (N) can be rated.

The number of units on each lake is illustrated in Table XXXI.

TABLE XXXI

LAKES WITH AND NUMBER OF 2N UNITS ON EACH LAKE

Lake(s)	Marie	Ironwood	Wolf	Cold
Number of 2N unit(s)	1	2	3	4

Frog, Lac La Biche, Cold, and Wolf Lakes have the nine 2Y units on their shorelands. The number of units on each lake is as shown in Table XXXII.

TABLE XXXII

NUMBER OF 2Y UNITS AND LAKES FOUND ON

Number of 2Y unit(s)	Lake(s)
1	Wolf
2 each	Lac La Biche, Cold
4	Frog

These 2Y units are ideally suited to boat launching, beaching and mooring, provision of support facilities, and are located on a waterway which has only minor limitations to family boating.[19]

[19]Canada Land Inventory, Agricultural Rehabilitation and Development Act and Rural Development, Field Manual: Land Capability Classification for Outdoor Recreation, June, 1967, p. 111.

In terms of Class 2 units, therefore, the lakes show the distribution found in Table XXXIII.

TABLE XXXIII

LAKES WITH CLASS 2 UNITS

Lake	Class 2+B	Class 2-B	Class 2N	Class 2Y	Total
Cold	4	8	4	2	18
Frog	4	6	0	4	14
Lac La Biche	5	7	0	2	14
Wolf	2	1	3	1	7
Ironwood	0	3	2	0	5
Muriel	4	1	0	0	5
Frenchman	0	3	0	0	3
Laurier	1	2	0	0	3
Touchwood	0	3	0	0	3
Beartrap	0	2	0	0	2
Beaver	1	1	0	0	2
Fishing	0	2	0	0	2
Marie	0	1	1	0	2
Moore	0	2	0	0	2
Pinehurst	0	2	0	0	2
Angling	0	1	0	0	1
Ethel	0	1	0	0	1
Floatingstone	0	1	0	0	1
Garner	0	1	0	0	1
Little Rock Island	0	1	0	0	1
Long	1	0	0	0	1
Manatokan	0	1	0	0	1
Moose	0	1	0	0	1
Spencer	0	1	0	0	1
Square	1	0	0	0	1
Vincent	0	1	0	0	1
Whitney	0	1	0	0	1
Lake north of Bluet Lake	0	1	0	0	1

Class 3 shoreland units. There are 261 Class 3 shoreland units--see Map 10. The types and number of units are as shown in Table XXXIV.

TABLE XXXIV

TYPES AND NUMBER OF CLASS 3 UNITS

Unit:	3B	3N	3Y	3K
Number:	78	153	16	14

Many of the units are continuous for long stretches on various lake shorelands, such as Class 3N on Chickenhill, Helena, Moore, Seibert, Soars, and Wolf Lakes; various Class 3 units on Cold, Frog, Marie, and Touchwood Lakes.

The 261 Class 3 shoreland units are distributed between forty-six lakes. In Table XXXV is shown the number of Class 3 units that the lakes have.

TABLE XXXV

NUMBER OF CLASS 3 UNITS AND LAKES FOUND ON

Number of Class 3 unit(s)	Lake(s)
36	Cold
22	Frog
15	Lac La Biche
14 each	Marie, Wolf
13	Touchwood
12	Moose
10	Seibert
9	Moore
8	Muriel
7	Upper Mann

TABLE XXXV (continued)

Number of Class 3 unit(s)	Lake(s)
6	Frenchman
5 each	Floatingstone, Ironwood, Pinehurst, Vincent
4 each	Ernestina, Fishing, Garner, Laurier, Soars, Spencer, Square
3 each	Beaver, Dabbs, Helena, Kinnaird, Long, May, Reita, lake immediately north of Bluet
2 each	Bluet, Chickenhill, Fork, Hilda, Jackson, Thompson Lakes, Tucker, lake east of Fishing
1 each	Beartrap, Bentley, Bourque, Kehiwin, Lower Mann, Shaw, Whitney

Class 4, 5, and 6 shoreland units. The remainder of the shoreland units are either Class 4, 5, or occasionally 6. No Class 7 shoreland units were present in the sub-region. There are very few Class 6 units and these are found on high capability lakes as well as on low. For example, Cold, Lac La Biche, and Muriel Lakes have Class 1+B units as well as a few Class 6 units.

Table XXXVI ranks the top twenty-five lakes according to the total number of units in the first three Classes for each lake.

A final ranking of the top fifteen lakes has been attempted. It will be seen that the writer's ranking is not always in entire agreement with that found in Table XXXVI. A number of reasons account for this.

Map 10
SUB-REGION
CLASS 3 SHORELANDS
1967

■ 3B shoreland unit ● 3N shoreland unit ▲ 3Y shoreland unit ▼ 3K shareland unit

0 10 20 miles



TABLE XXXVI

TOP TWENTY-FIVE LAKES BASED ON THE NUMBER OF UNITS IN FIRST THREE CLASSES FOR EACH LAKE

Lake	Ranking	Class 1B unit(s)	Class 2 unit(s)	Class 3 unit(s)	Total
Cold	1	11	18	36	65
Frog	2	7	14	22	43
Lac La Biche	3	5	14	15	34
Wolf	4	0	7	14	21
Marie	5	4	2	14	20
Touchwood	6	1	3	13	17
Muriel	7	2	5	8	15
Moose	8	0	1	12	14
Moore	9	1	2	9	11
Ironwood	10	0	5	5	10
Seibert	11	0	0	10	10
Frenchman	12	0	3	6	9
Pinehurst	13	1	2	5	8
Laurier	14	0	3	4	7
Fishing	15	0	2	4	6
Vincent	16	0	1	5	6
Floatingstone	17	0	1	5	6
Beaver	18	0	2	3	5
Spencer	19	0	1	4	5
Square	20	0	1	4	5
Garner	21	0	1	4	5
Lake immediately north of Bluet Lake	22	0	1	3	4
Fork	23	1	0	2	3
Helena	24	0	0	3	3
Whitney	25	0	1	1	2

Firstly, it should be noted that the number of units is not an absolute criterion since some lakes may have a smaller number of units but a greater area or length for each unit. Secondly, some lakes such as Wolf, have more units

for the first three classes than other lakes, such as Marie. However, Marie Lake has four Class 1B units whereas Wolf has none. Thus, it is felt that in such a case Marie Lake, because of its superior beaches, would have the higher capability despite the lower total number of units. It is because of considerations such as these that the following top fifteen lakes in the sub-region are not in the same order as in Table XXXVI. The top fifteen lakes are shown in Table XXXVII. However, only Fork, which in Table XXXVI is listed twenty-third, occurs in Table XXXVII, in preference of Fishing listed fifteenth.

TABLE XXXVII

FINAL RANKING OF THE TOP FIFTEEN LAKES

Ranking	Lake
1	Cold
2	Frog
3	Lac La Biche
4	Marie
5	Muriel
6	Pinehurst
7	Touchwood
8	Wolf
9	Moose
10	Fork
11	Moore
12	Ironwood
13	Seibert
14	Frenchman
15	Laurier

It can be concluded that the recreational capability of the 111 lakes in the sub-region is very high. None of the physical characteristics of the lakes appear to detract very much from the recreational capability of the lakes. For example, the summer water temperatures appear suitable for swimming, bathing, and so on. Angling capability is certainly very high. Lastly, the large number of lakes with Class 1 and 2 units underscores the high recreational capability of the lakes as a whole.

CHAPTER IV

ANALYSIS OF PRESENT RECREATIONAL LAND USE ON THE LAKE SHORELANDS

Many of the lakes in the sub-region have some existing form of recreational land use on their shorelands. During the course of the field work present recreational land use on the lake shorelands was mapped. No formal classification was used. Cottage sites, campsites, summer resorts, summer camps, and so on were simply located on a working map along with a short description of the facilities, vegetation, and so on of each. This recreational land use will be examined under the following categories: (1) recreational areas owned and operated by either provincial or local municipal government, (2) privately owned and operated recreational areas, and cottages. Accessibility to the lakes in the sub-region as a whole will be described first in order to anticipate later discussion on the present recreational land use.

Accessibility to the Lakes in the Sub-region

Most of the lakes are accessible by all weather roads, either paved or gravelled. A few are accessible only via dry weather roads for cars, or via trails negotiable only by trucks or four-wheeled drive vehicles. Alberta Highway Numbers 46, 28, 28A, 36, and 41, and the Saskatchewan Highway Number 55 form the main access routes into and within the sub-region. Map 11 illustrates

Map 11

SUB-REGION

MAIN ACCESS ROUTES TO LAKES

1967-68

All weather road — poved

All weather road — gravelled

Dry weather road

Truck or faur-wheel drive vehicle raod

0 10 20 miles

Source: *Alberta Dept of Highways, Alberta Dept. of Lands and Forests, Soskatchewan Dept of Highways and Transportation, Canada Surveys and Mapping Branch, Department of Energy, Mines and Resources, County of St Paul No 19, Field Work*



the main vehicular access routes during summer to these lakes in the sub-region. The routes shown in Map 11 are generally as they were in 1967. However, some of the routes on the map were updated to 1968 to indicate paving (Highway Number 46) and re-routing (Highway Number 46 west of Lac La Biche). Some lakes, such as Cold, Lac La Biche, Moose, and Muriel, have many access routes to their shorelands. For these lakes, only the all weather access routes are shown. From the Alberta side, Cold Lake is accessible via a paved Highway. Indications are that in the next three or four years, if future construction programs continue as in the past, such will be the case for Lac La Biche following the completion of a paved Highway Number 46.[1]

All the lakes are not equally accessible in summer. Three distinct pockets of inaccessible lakes exist within the region. The first pocket lies between Lac La Biche and Touchwood Lakes. They comprise Jackson, Kinnaird, Blackett, Dabbs, Shaw, McGuffin, and Brown Lakes. Spencer Lake, which lies to the east of this group of lakes is also inaccessible. The major portion of Spencer Lake is within the Primrose Lake Air Weapons Range security area and unauthorized personnel are not permitted to trespass. The second pocket comprises Sinclair, Bourque, Leming Lakes and lies between Marie and Wolf Lakes. The third pocket covers the area northeast of Frog Lake and along the Saskatchewan border. These lakes include: Thompson, Soars, Bates, Redspring,

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[1] Personal communication with Alberta Department of Highways, April, 1969.

Little Rock Island, Bear, Birch, and Meridian. They are inaccessible to cars, trucks, and even four-wheeled drive vehicles, and may be reached only on foot or horse-back. Amphibious planes can be used to reach those lakes large enough for such aircraft to land.

In late fall when the muskeg and other soft ground freeze, some of these lakes can also be reached by truck or four-wheeled drive vehicles. Because of snow drifts, however, many lakes during winter are inaccessible to cars and trucks. During the winter, power toboggans and ski-equipped airplanes can be used to reach most of those lakes.

Existing Recreational Areas

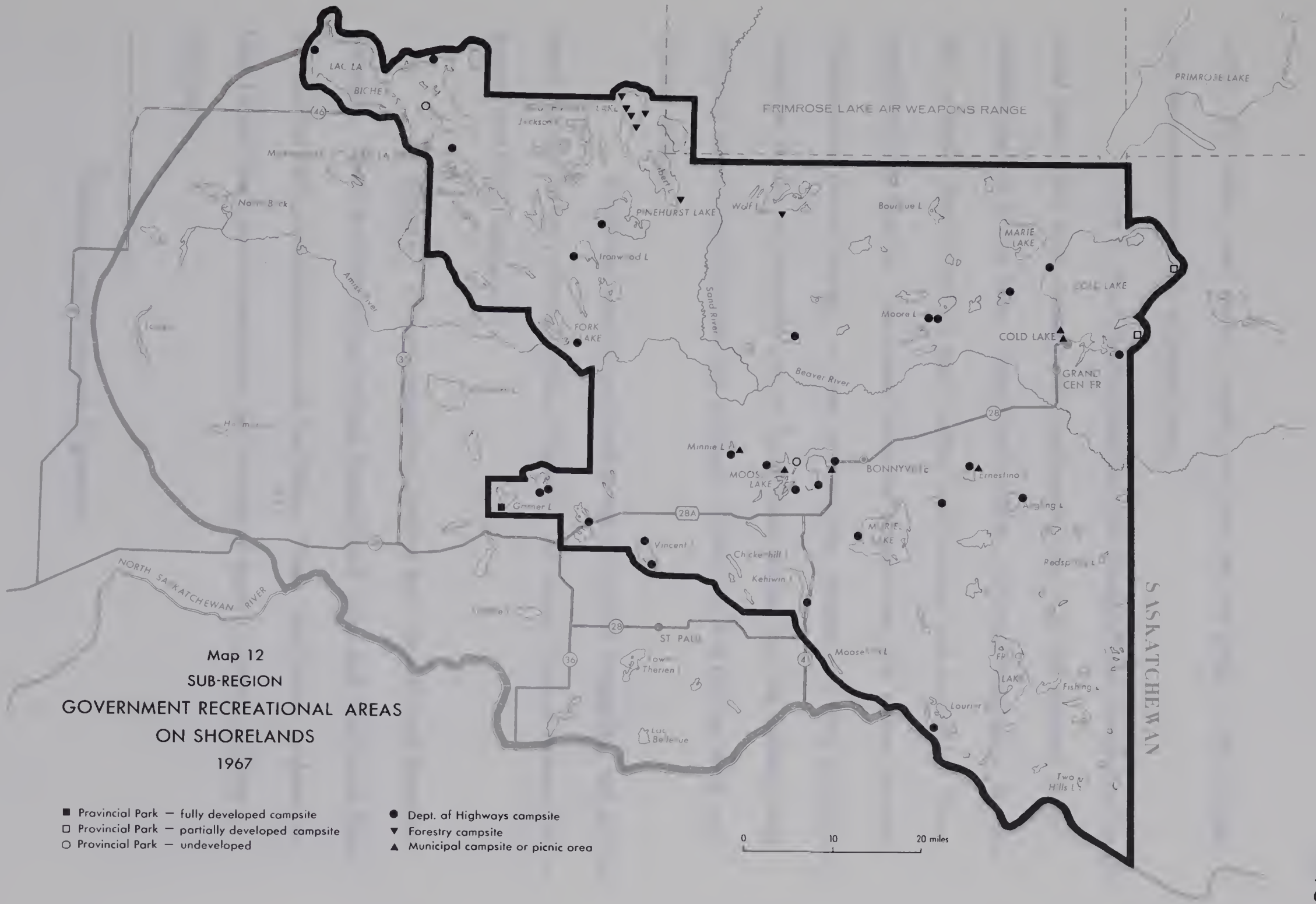
There are two forms of administration for outdoor recreation in the sub-region. One is governmental, the other is private.

Governmental. The Governments of Alberta and Saskatchewan administer through various ministries. Saskatchewan operates Meadow Lake Provincial Park on Cold Lake through the Parks Branch of the Department of Natural Resources. Alberta's operation of its three parks (Garner Lake Provincial Park, Sir Winston Churchill Provincial Park, and Moose Lake Provincial Park) in the sub-region is through the Parks Division of the Department of Lands and Forests. The Highways Department of the Alberta Government also operates twenty-eight campsites, while the Forest Service of the Department of Lands and Forests is responsible for seven campsites in the Green Area of the sub-

region (see Map 12). There are six municipal campsites and picnic areas. Five are campsites of the Municipal District of Bonnyville (No. 87) and one, Kinosoo Park, is administered by the town of Cold Lake.

The entire eastern portion of Cold Lake which lies in Saskatchewan is a part of Saskatchewan's Meadow Lake Provincial Park. There is year-round supervision in this park. Map 12 shows the location, on Cold Lake, of two partially developed campsites within Meadow Lake Provincial Park. The northern campsite within Meadow Lake Provincial Park has a dry toilet, several picnic tables, and several metal fireplaces. The southern one appears to be used very infrequently but has several picnic tables and concrete fireplaces. Two Alberta Provincial Parks, Moose Lake and Sir Winston Churchill Provincial Park on Lac La Biche, were undeveloped up to 1967. However, currently (1969), Sir Winston Churchill Provincial Park is being developed. The other Alberta Provincial Park is located on Garner Lake. A permanent government employee supervises Garner Lake Provincial Park. The Alberta Provincial Park on Garner Lake has a fully developed campsite with dry toilets, pedestal stoves, tent pads, kitchen shelters, picnic tables, change houses, dock, playground facilities, fish cleaning tables, wells, concession booth, boat rentals, and public telephone.

There is no permanent supervisor at any of the Highways campsites, and maintenance is by local Highway crews. These campsites generally provide the same type of facilities -- kitchen shelter, concrete fireplaces, picnic tables,



Map 12

SUB-REGION

GOVERNMENT RECREATIONAL AREAS

ON SHORELANDS

1967

- ■ Provincial Park — fully developed campsite
- □ Provincial Park — partially developed campsite
- ○ Provincial Park — undeveloped
- ● Dept. of Highways campsite
- ▼ Forestry campsite
- ▲ Municipal campsite or picnic area



water, dry toilets, and wood. Usually the sites are not large -- the average size being approximately eighteen acres.[2]

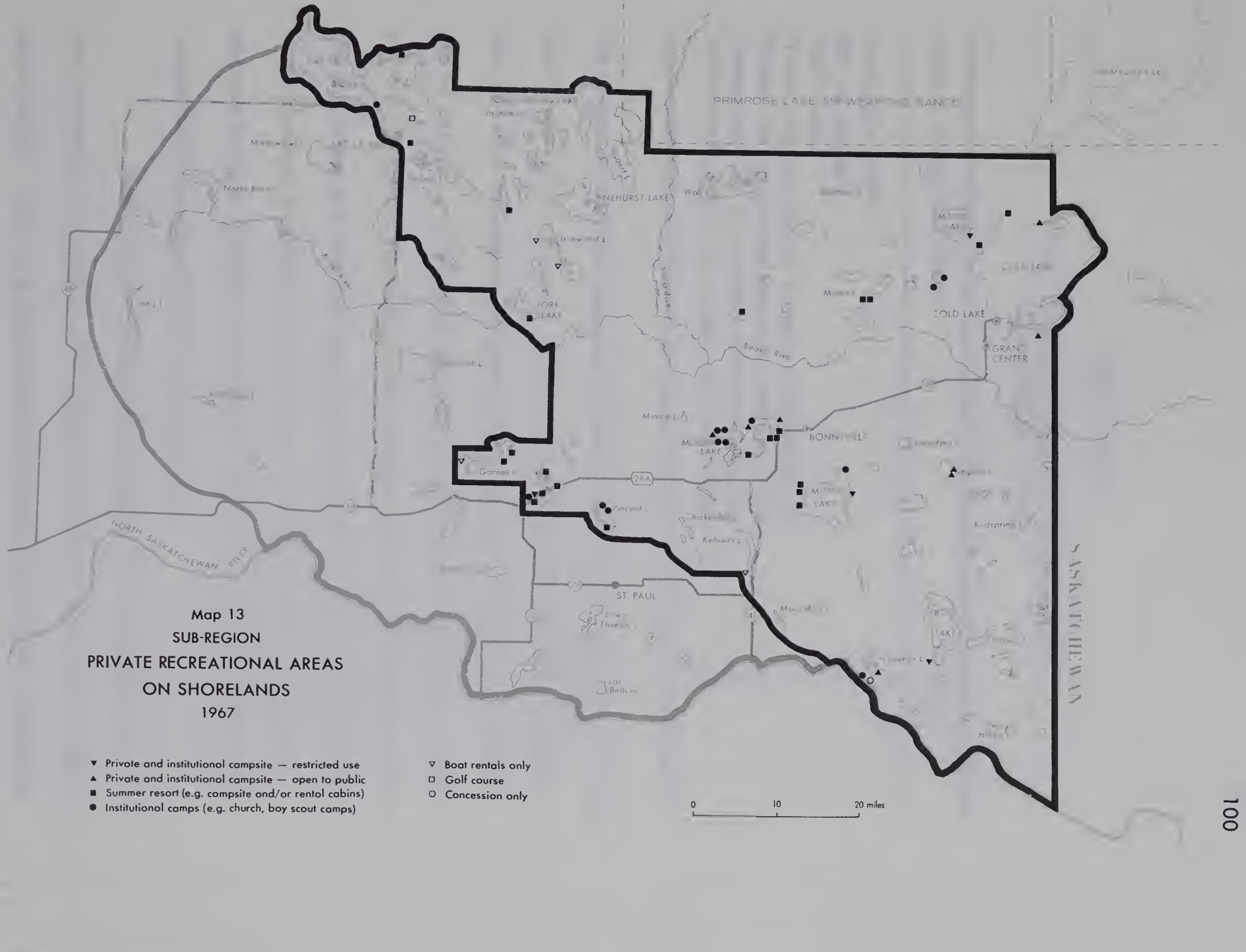
Five of the Alberta Forest Service campsites are located on Touchwood Lake. The main campsite on Touchwood Lake is in the extreme northwestern portion of the lake. Here picnic tables, concrete fireplaces, dry toilets, a dock, boat launching pad, water, and firewood are available. The remaining four sites on Touchwood Lake are simply sites with either concrete fireplaces or picnic tables. In terms of facilities, Seibert and Wolf Lakes have campsites similar to the main one on Touchwood except that the Seibert Lake campsite has a kitchen shelter but no dock. Wolf Lake has neither dock nor kitchen shelter.

Facilities usually provided at the municipal campsites, and picnic areas are dry toilets, picnic tables, fireplaces or stoves, change houses, playground facilities, and docks.

Private. Private operations involve both recreational areas and cottages. There are fifty-three private recreational areas and they range from concessions only to membership club facilities. Their distribution is shown on Map 13 and the types of operations and number of each is shown by Table XXXVIII.

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[2]Alberta Department of Highways.



Map 13

SUB-REGION

PRIVATE RECREATIONAL AREAS

ON SHORELANDS

1967

- ▼ Privote and institutionol campsite — restricted use
- ▲ Private and institutionol campsite — open to public
- ■ Summer resort (e.g. compsite ond/or rentol cabins)
- ● Institutionol camps (e.g. church, boy scout camps)
- ▽ Boat rentals only
- □ Golf course
- ○ Concession only



TABLE XXXVIII

TYPES OF PRIVATE RECREATIONAL AREAS
AND NUMBER OF EACH

Types of recreational areas	Number
Concession only	1
Boat rentals only	4
Golf course	1
Private and institutional campsite--restricted use	4
Private and institutional campsite-- open to public	8
Summer resort (e.g., campsite and/or rental cabins)	23
Institutional camps (e.g., church, boy scout camps)	13

The private recreational areas are scattered throughout the area. All the summer resorts have rental cabins and usually most have campsites as well. Many provide for rental of boats and outboard motors, and some have playground facilities for children. An untypical example of a private and institutional campsite which is not open to the public is the Canadian Forces campsite on Marie Lake. The golf course is a nine hole course with sand greens. The course is located on the southeast shoreland of Lac La Biche. Most of the private recreational areas are found on the lakes near Highway Numbers 28 and 28A. Moose Lake is especially favored for private recreational sites.

Map 14 shows the location and number of private cottages on lake shorelands in the region. The number of cottages at each site is at best an approximation. They were derived from field examination of each cottage site

Map 14

SUB-REGION

LOCATION AND NUMBER OF PRIVATE COTTAGES ON SHORELANDS

1967

(3) Three cottages are located an the indicated length of the lake shoreland

0 10 20 miles



and the possibility exists that what the author interpreted as a cottage may well have been a permanent residence, a shed, or an abandoned building. However, despite these shortcomings, Map 14 does serve the purpose of illustrating which lakes are currently being used for "cottaging." It also gives a visual impression of intensity of use.

Sixteen lakes are occupied for cottaging -- Garner, Floatingstone, Lower Mann, Upper Mann, Vincent, Moose, Muriel, Cold, Marie, Ethel, Moore, Laurier, Whitney, Fork, Beaver, and Lac La Biche. Here again, the more frequent use of lakes close to Highway Numbers 28 and 28A is evident. The very intensive use of Moose Lake for cottaging, is similar to that indicated for the private recreational areas. The four lake-size categories discussed earlier have been used in an attempt to discern whether any cottage occupation patterns existed. Table XXXIX illustrates the result.

TABLE XXXIX

PER CENT OF COTTAGES ON VARIOUS LAKE SIZES

Lake size	Per cent of cottages
5 or less square miles	45.9
6 to 20 square miles	31.3
21 to 50 square miles	5.1
Over 50 square miles	17.7

From the large percentage (77.2) of cottages in the first two categories it appears

that lakes in the twenty square mile and under categories are the most popular lake sizes for cottages. This tendency will be further discussed in Chapter VII. where cottagers' lake-size preferences as indicated by the cottage questionnaire are analyzed.

CHAPTER V

METHODOLOGY FOR RECREATIONAL USER STUDIES

Following upon the collection of data via questionnaire and interview from campsite, resort, and cottage users in the sub-region, certain points concerning the gathering of such information have come to light. These will be examined before information is analyzed showing the preferences indicated by the various users in the region. There were two different methods used in collecting this user information; that for the cottager was done by mail questionnaire only, while that for the campsite and summer resort user was collected as described below.

Campsite and Summer Resort User Study

A campsite and summer resort user study for the total region was carried out between July 24 and August 10, 1967. Personal interviews were conducted with 149 individuals representing either themselves, their families or a party of people. The size of the region did not permit the planning of any statistical techniques of sampling. The author simply drove to each campsite or summer resort and attempted to interview as many of the recreationists there as was possible. If for example, there were no recreationists in a particular campsite then the author moved on. If there were very many

users of say, a Provincial Park on a weekend then the author chose an arbitrary sample. Some interviews were also obtained from users of undesignated campgrounds or picnic sites, and apparent casual users of open spaces along lakes which were not posted or fenced against trespassing. Every lake on which there was a campsite or summer resort was visited during the eighteen day interview period. This allowed coverage of approximately forty lakes.

A sample questionnaire is presented in Appendix C. A number of shortcomings were discerned in the questionnaire during the course of the interviewing. Most respondents found it difficult to select only one main purpose in Question 4. A combination of purposes would generally have been preferred. In Question 5 the categories were too broad. Furthermore, it was not made clear in the question whether the distances indicated were maximum distances. An open-ended question which later could have been coded would probably have been preferable in this case. During the course of the interviewing, a "longer distance" category was incorporated into the first two parts of Question 5. Question 14 should have had a "no" alternative, and in Question 19 a differentiation should have been made between tent trailers and house trailers. Many people use their friends' boats and this should have been provided for in Question 21. Question 29 should have been designed differently to make clear that only one answer was to be selected. The wording in Question 35 superficially appears sound. Individual expenditure was the purpose of the question. However, all respondents were either with their

families or a party of friends and consequently found it very difficult to separate expenditures for themselves as opposed to expenditure for the entire family or group. Generally, however, it is felt that the questionnaire is basically sound and has provided valuable information on campsite and summer resort users where there was little previously available.

Cottage User Study

The cottage user study was done in a different manner. A mailed questionnaire was used. Once again, though the direct interview method may have been preferable, the element of time dictated the use of the mailed questionnaire. In defence of this method, the findings of Shafer may be quoted. He found in two studies that handout and mail surveys--with four waves of reminder notices to nonrespondents--provided results that were the same as personal interview results in 75 to 87 per cent of the questions. Delayed mail surveys conducted three months after the surveying experience, appeared preferable to handout or immediate mail surveys.[1]

Cottage owners' names and addresses were obtained from the tax rolls of the various local government offices in and outside the region.[2] This

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[1]Elwood L. Shafer Jr., Effects of Sampling Location, Period and Method on Camper Survey Results, Ph.D. thesis, Syracuse State University College of Forestry, 1966, 245 pp.; E. L. Shafer Jr., and John F. Hamilton Jr., A Comparison of Four Survey Techniques Used in Outdoor Recreation Research. Northeastern Forest Experiment Station, Upper Darby, Pennsylvania, 1967, 22 pp.

[2]Generally local governments regard a cottage as a seasonal residential building used for recreational purposes. Cottage sites without a cottage were not considered in this study.

was done during October and November, 1967. It was found that there were approximately 560 cottages in the region. However, only 546 questionnaires were sent out to cottage owners at the end of November, 1967. The entire cottage population was not sent a questionnaire for two reasons: (1) some shoreland owners who rented out cottage sites requested very firmly that cottagers on their land should not be "bothered," (2) a number of cottagers on Moose Lake had recently answered a similar questionnaire sent out by the Alberta Fish and Wildlife Division of the Department of Lands and Forests, and it was felt that these cottagers too, should not be troubled again. Some cottages are jointly owned by two different parties. To some of these cottagers (six) a separate questionnaire was sent to each part owner. A reply to the questionnaire was requested approximately within two weeks after mailing.[3] Most of the questionnaires were returned within the two week period. A total of 300 replies or a 55 per cent return was eventually received. Of these 300 responses, twenty-six were not usuable for processing because of: (1) nil responses, (2) cottage no longer owned, (3) no cottage on site, (4) summer resort owner, (5) permanent residence. In addition to the 300 responses, eighteen questionnaires were returned because of incorrect addresses.

Table XL prepared from the answers, shows the lakes with cottages on their shorelands, the number of cottages on each lake, the number of

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[3]See Appendix D for an example of the cottage questionnaire and the cover letter used.

TABLE XL

NUMBER OF COTTAGES AND RESPONDENTS, AND PERCENTAGE RESPONSE PER LAKE

Name of Lake	Number of cottages	Number of respondents	Percentage response
Skeleton	48	24	50.0
Amisk	6	3	50.0
Long	85	44	51.8
Hanmore	12	8	66.7
Garner	19	13	68.4
Whitefish	17	6	35.3
Marie	6	3	50.0
Beaver	13	6	46.2
Moose	89	50	56.2
Moore	18	7	38.9
Fork	4	2	50.0
Lac La Biche	40	23	57.5
Whitney	29	10	34.5
Laurier	46	21	45.7
Lac Saint Cyr	6	1	16.7
Vincent	40	18	45.0
Upper Mann	8	5	63.3
Lower Mann	16	10	62.5
Floatingstone	16	6	37.5
Cold	23	10	43.5
Bonny	1	0	0.0
Ethel	1	1	100.0
Lac Santé	1	0	0.0
Muriel	16	1	6.3

respondents per lake, and the percentage response per lake.[4] From a perusal of the table, one can see that generally the lakes are reasonably represented in the returns. No one lake is over-represented or dominates the return. Muriel Lake is the only lake, apart from the lakes with only one cottage, which has a very low response. The reason is that only three of the sixteen cottagers were sent questionnaires because the remaining thirteen rented their cottage sites from one owner who had requested that the cottagers on his land be not sent questionnaires. These thirteen cottagers were not subsequently contacted.

Like the campsite and summer resort questionnaire, the cottage questionnaire too has weaknesses which did not become obvious until after the returns. Question 3 should have had a provision for joint ownership. Problems showed in Questions 9, 10, and 11. When a husband and wife both owned a cottage, problems developed as to whose age, occupation, and sex was put down. A stipulation for the head of the household should have been provided in this case.

Questions 12, 13, 14, and 15 presented a number of problems also. A ranking for only the top five or less, most important options should have been asked. This is especially important to Questions 13 and 15 where people tended to do so despite no instructions. Also, for Questions 14 and 15 the author

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[4]Since some cottages are jointly owned, for these cottages two responses were received. This was the case with two cottages on Hanmore Lake. In Table XL, however, only one respondent was used per cottage in order not to bias the return per cottage.

unfortunately assumed that all the cottagers had problems with their site, and hence a "no problems" option was not provided.

In Question 16 the specification of family size was very poorly answered primarily because of faulty question design. It should have been explicitly stated that the respondent, respondent's spouse, and children were to have been included. A question concerning how many members there are in the household may have been enlightening too. Then a question concerning how many members of the household use the cottage would also have been appropriate.

Question 17 was ambiguous, and is probably the most poorly designed of the questions. Firstly, total number of days that the cottage is used both in summer and winter should have been asked. Secondly, a better interpretation of the middle of the week period (e.g., "1-2 days each week," "less than 1 day each week") should have been offered.

Season in Question 20 should have been defined probably along the lines in Question 17 in order to avoid ambiguity. A "do not own or use a boat" alternative should have been provided in Question 23. As it stands, the question assumes everyone owns or uses a boat while at the cottage.

Thus, despite the care taken in the design and aesthetics of the questionnaire, problems still developed, but a number of lessons were learned. Firstly, in a mail questionnaire, particularly, explanation must be at a maximum. One consequently may incur the problem of questionnaire length and bulk. As a result, only essential questions must be asked. This may work well with a

problem oriented study, but in a broad fact gathering study such as this, complex problems are encountered in attempting to decide what the most pertinent questions are that need answering. Of course, many problems may be eliminated through the use of a pilot study.

However, in spite of the problems encountered by the cottagers in answering the questionnaire, they were able to supply a large amount of information about themselves. This information takes on added value when one realizes that, as with the campsite and summer resort users, the survey is one of the first of its type in the region. In the following chapters then, these data will be analysed with a view to the assessment of the recreational potential of the lakes of the region and to the mapping of areas with respect to their best possible use in the future.

CHAPTER VI

ANALYSIS OF CAMPSITE AND SUMMER RESORT USER DATA

The data from the 149 respondents in the campsite and summer resort user study will be analyzed under the following broad headings: (1) campsite and summer resort user hinterland, (2) socio-economic characteristics, (3) recreational activities and intensity of use, (4) destination selection, (5) accommodation, (6) campsite facilities, (7) expenditures.

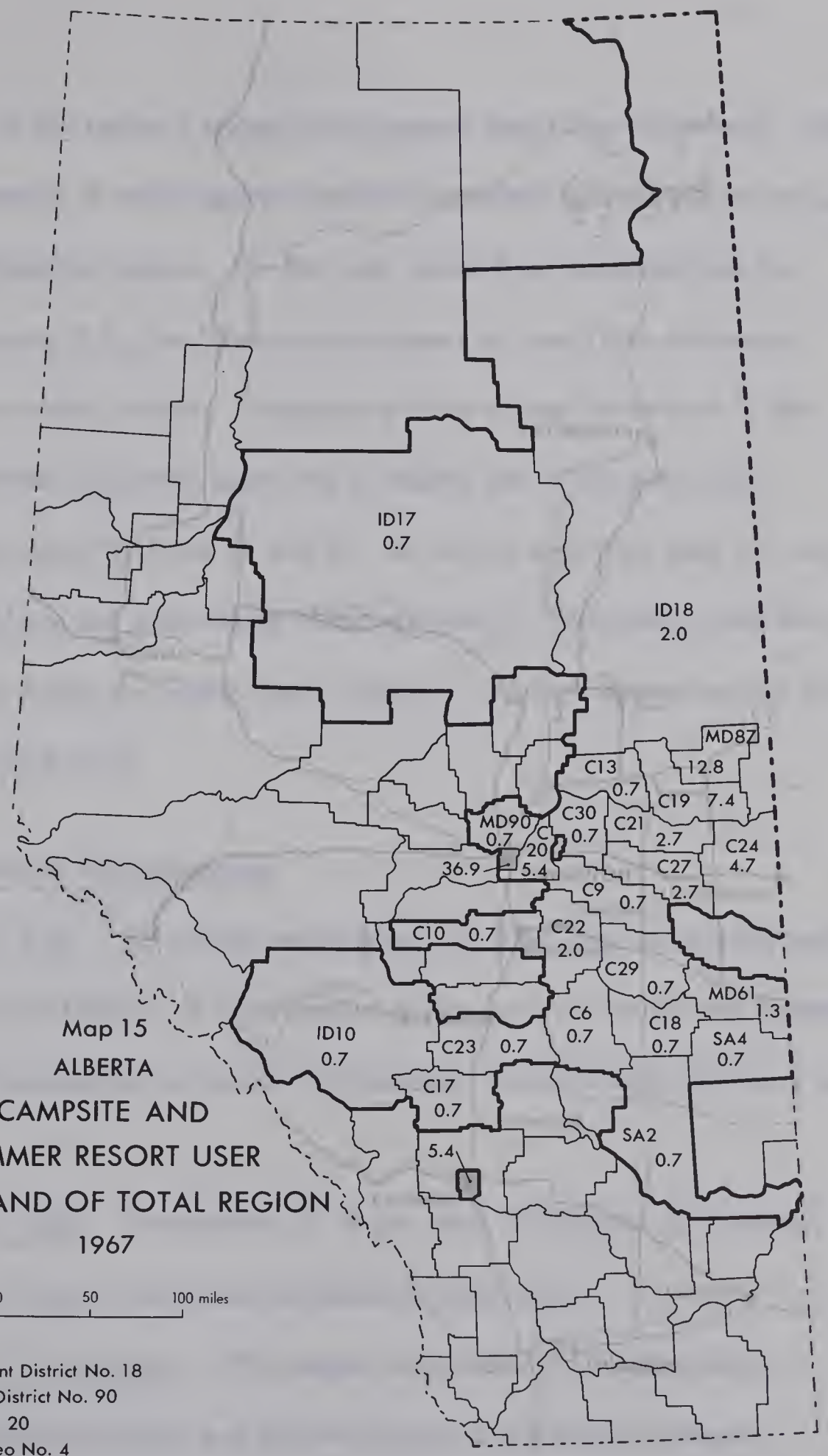
Hinterland deals with the region from which the recreationists come into the Lakes district. Socio-economic characteristics deal with: sex, age, occupation, and annual income. In the recreational activities and intensity of use analysis, the examination is made of: (1) recreational activities both in summer and other seasons, (2) length of stay, (3) size of participating group, (4) frequency of use of the various lakes, (5) use of other lakes. Under destination selection is discussed the main purpose of the trip, the distances users are willing to travel for the various activities, type of holiday, and opinion on gravel roads. As to the campsite facilities, the users' preferences for developed and undeveloped campsites will be analyzed as well as their rating of facilities at developed campsites open to the public.

(1) The User Hinterland

The addresses of the respondents to the campsite and summer resort user study were used to arrive at the hinterland delineated on Map 15. This perhaps is not the true hinterland as the sample used is small. However, it does give an indication of the permanent residence of the users of the campsites and summer resorts in the region. Listed in order of significance, the primary users came from: (1) Edmonton and County No. 20 to the east, (2) within the region, (3) areas to the immediate south and southwest, (4) Calgary. Almost 37 per cent of the users interviewed came from Edmonton and 5.4 per cent came from County No. 20 immediately east of Edmonton. Approximately 22 per cent came from within the study area itself. Users from Calgary accounted for 5.4 per cent of the respondents. County No. 24, within which lies Lloydminster, supplied 4.7 per cent (seven respondents). Only two of the seven respondents were from Lloydminster itself.

Of the nineteen respondents (12.8 per cent of total) who came from Municipal District No. 87, twelve (8.1 per cent of all respondents) were from the Canadian Forces Air Base at Cold Lake. The Air Force personnel very intensively use the campsite and summer resort facilities in the immediate area of the Air Base. In all, 7.6 per cent of the users came from outside Alberta; 3.5 per cent came from the rest of Canada and 4.1 per cent from the United States.

Since the hinterland map was based on municipal districts and because some of the districts are very large, it is difficult to establish the



ID18 Improvement District No. 18
MD90 Municipol District No. 90
C20 County No. 20
SA4 Speciol Areo No. 4
36.9 Percentoge of the totol number of compsite ond summer resort users interviewed in total region that come from particulor municipolity, province, or stote

Northwest Territories — 0.7%
British Columbio — 0.7%
Soskatchewon — 0.7%
Monitobo — 0.7%
Ontorio — 0.7%
Konsos — 0.7%
New Mexico — 0.7%
Colorodo — 0.7%
Californio — 2.0%



precise extent of the region's campsite and summer resort user hinterland. However, approximately it would appear that the hinterland extends 200 miles south and southwest from the region. On the west, apart from Edmonton and the county to the north of it, the lakes region appears to have little influence beyond its own western border. It appears to have a large hinterland to the north and northwest, but once again this is largely due to the great areal extent of Improvement Districts 17 and 18. As can be seen from Map 15, very few users come from the outer edges of the hinterland. Most users come from either Edmonton, from within the region itself, Calgary, or a belt approximately 50 miles in width south of it.

(2) Socio-economic Characteristics

(a) Sex. Of all the respondents, 73.8 per cent were male and 26.1 per cent were female. A high number of females was interviewed because wives supplied information in lieu of the husbands who were away fishing or at work.

(b) Age. The majority (76.4 per cent) of the users are between 24 and 50 years of age, distributed as shown in Table XLI.

(c) Occupation. With respect to occupation of respondents, craftsmen, production process and related workers occupational category accounted for 20.1 per cent of the users (see Table XLII). Housewives were next in importance. The third and fourth important occupational categories

TABLE XLI

AGES OF USERS

Age group	Per cent of respondents
15 - 19 years	2.7
20 - 24 years	4.7
25 - 29 years	13.4
30 - 34 years	17.4
35 - 39 years	14.1
40 - 44 years	15.4
45 - 49 years	16.1
50 - 54 years	8.1
55 - 59 years	1.3
60 - 64 years	4.0
65 - 69 years	0.7
70 + years	0.7
No reply	1.3

were respectively: professional and technical, and managerial. Farmers and farm workers accounted for 6.7 per cent of the users, indicating some limited use of the campsites and summer resorts by the farm element of the population. Labourers accounted for only 1.3 per cent of the users. Thus, professional, managerial, skilled, and semi-skilled people were included among the users.

TABLE XLII

OCCUPATIONS OF USERS

Occupation	Per cent of respondents
Managerial	7.4
Professional and technical	10.4
Clerical	4.7
Sales	1.3
Service and recreation	6.7
Transport and communication	6.7
Farmers and farm workers	6.7
Miners, quarrymen and related workers	0.7
Craftsmen, production process and related workers	20.1
Labourers	1.3
Retired	1.3
Students	3.4
Housewives	19.5
Inadequate response	9.4
No reply	0.7

(d) Annual family income. Forty-three per cent of the users interviewed were in the $5,001 to $7,500 income category. In the $2,501 to $5,000 category there were 22.8 per cent, and in the $7,501 to $10,000 category there were 16.8 per cent. Only a small percentage (6.0) of the

users had an income below $2,500, and only a small percentage (8.9) above $10,000. Thus, the family income for 82.6 per cent of the users was between $2,500 and $10,000 with nearly 50 per cent of them falling between $5,000 and $7,500 (See Table XLIII).

TABLE XLIII

ANNUAL INCOME OF FAMILY OF USERS

Income range	Per cent of respondents
$2,500 or less	6.0
$2,501 to $ 5,000	22.8
$5,001 to $ 7,500	43.0
$7,501 to $10,000	16.8
More than $10,000	8.9
No Reply	2.7

(3) Recreational Activities and Intensity of Use

(a) Recreational activities. Respondents were asked to indicate all of the activities they planned to do while at the lake. Table XLIV indicates for each activity, the percentage of the total number of respondents who indicated they would partake in it. For example, 88.6 per cent of the total of 149 respondents indicated that they planned to fish, while only 5.4 per cent of the 149 respondents planned to golf.

Fishing, camping, boating, and swimming were picked by more than fifty per cent of the respondents. Thirty-five, or 23.5 per cent, of the users listed other activities they planned to do while at the lake. To illustrate, fourteen, or 9.4 per cent, listed berry picking. Eleven, or 7.4 per cent, wanted merely to rest, relax, or "laze around." The remaining 6.7 per cent of the respondents indicated various types of activities such as: visiting, scuba-diving, playing ball, singing, enjoying the quietness, building sand castles, and drinking beer.

TABLE XLIV

SUMMER RECREATIONAL ACTIVITIES USERS UNDERTOOK WHILE AT LAKE

Activity	Per cent of respondents
Fish	88.6
Camp	76.5
Boat	73.8
Swim	72.5
Picnic	42.3
Sight-see	36.2
Photography	28.9
Hike	23.5
Water-ski	18.1
Golf	5.4
Hunt	0.0
Others	23.5

Fifty-seven per cent then indicated that they owned a boat. Whereas, 42.3 per cent did not. There was no response from 0.7 per cent. Renting a boat was indicated by 44.3 per cent, and 53.7 per cent did not; 2.0 per cent did not respond.

Concerning fishing, the users were queried as to whether the boating, swimming, camping, and picnicking opportunities on the lake where the interview took place would warrant their coming to the lake if there was no fishing available. Forty-nine per cent said they would not come if there were no fish, while 50.3 per cent said they would come. There was no response from 0.7 per cent. Thus, the importance of the availability of sport fishing is illustrated here: first, by the number of respondents (88.6 per cent) listing fishing as one of the recreational activities engaged in, and secondly, by the number (49.0 per cent) who would not come to the lake if there was no fishing available.

(b) Length of stay. Users were asked to indicate how long they expected to stay at their chosen lake. Of the number, 16.1 per cent indicated less than twelve hours. The planned length of stay for the remaining 83.9 per cent of the users is shown in Table XLV.

Most users stayed for a period ranging from only a few hours to fifteen days. A stay of one to three days was the most common--32.2 per cent of the users, while 47.0 per cent stayed as long as six days.

TABLE XLV

PLANNED LENGTH OF STAY OF USERS

Days	Per cent of respondents
1 - 3	32.2
4 - 6	14.8
7 - 9	12.8
10 - 12	5.4
13 - 15	10.1
16 - 18	0.7
19 - 21	3.4
22 - 24	0.0
25 - 27	0.7
28 - 30	2.0
71 - 80	0.7
101 - 110	0.7
121 - 130	0.7

(c) Size of group. A majority of the respondents (61.7 per cent) were with their families. The remaining 38.3 per cent of the groups comprised parties of users such as a party of males or females, father and son, a number of families together. None of the users interviewed was alone. The mean size of the families was 4.7 individuals. This was made up of a mean number of: (1) 1.2 females, (2) 1.1 males, (3) 2.0 children 12 years or younger, (4) 0.5 children over 12 years of age. The mean party size was 8.5 individuals. This was made up of: (1) 2.1 females, (2) 2.9 males, (3) 2.6 children 12 years or younger, (4) 0.8 children over 12 years of age.

Thus, for both family and party groups there were very few children over 12 years of age. No upper age limit was set for children over 12 years of age because it is felt that children over this age are beginning to enjoy the same activities as adults. It is felt that children 12 years old and under, require facilities different from adults, e.g., playgrounds. Thus, it is the 12 and under group that is important in terms of facility provision and consequently definite age demarcation.

(d) Frequency of use of lakes. Respondents were asked how often they used the particular lake where the interview took place during the summer and winter. Summer use is indicated by the following Table.

TABLE XLVI

FREQUENCY OF SUMMER USE OF LAKES BY USERS

Use	Per cent of respondents
1 - 2 times	55.7
3 - 6 times	22.8
More than 6 times	20.8
No reply	0.7

Most people visited the lake at least once or twice during the summer. A sizeable portion (20.8 per cent), however, visited the lake more than 6 times while 78.5 per cent visited it six times or fewer during the summer.

Table XLVII indicates the frequency of winter use of the lakes. There was very little winter use by the respondents interviewed.

TABLE XLVII

FREQUENCY OF WINTER USE OF LAKES BY USERS

Use	Per cent of respondents
0 times	83.2
1 - 2 times	9.4
3 - 6 times	3.4
More than 6 times	2.7
No reply	1.3

Only 15.5 per cent of the respondents used the lakes at all during the winter. The reasons for this are not stated. Some clues are forthcoming from Chapter VII when cottagers were queried specifically about winter use. For example, 44.2 per cent of the cottagers indicated winter use. However, only 3.4 per cent of the campsite and summer resort respondents indicated owning a cottage. It will be remembered that the severity of the winter climate will necessitate winterized accommodation such as a cottage for any frequent or prolonged use. Cottagers, it will be seen, indicated vehicle access in winter to their cottage site as the third most serious problem with their cottage site.

This would more seriously apply to the campsite and summer resort users. Another reason is that most of the campsites and summer resorts are not open during winter. This aspect of winter use was not examined directly in the questionnaire, but one would expect very little winter use for the above reasons.

(e) Recreational activities in other seasons. When the respondents were asked whether they came to the lake for recreational activities in any other season, either alone or with their family, 15.4 per cent or 23 respondents said yes. This corresponds closely with the previous indicated winter use. Of all respondents, 11.4 per cent indicated winter use and 4.0 per cent and 2.0 per cent respectively indicated fall and spring use. Recreational activities engaged in were as shown in Table XLVIII.

TABLE XLVIII

RECREATIONAL ACTIVITIES ENGAGED IN BY USERS IN SEASONS OTHER THAN SUMMER

Activities	Per cent of all respondents
Ice fishing	10.7
Fishing	2.0
Hunting	2.0
Skating	1.5
Hiking	0.7

To the question whether they came with their families in any other season of the year, only 5.4 per cent said they did. Except for one person who did not reply, all came during the winter. Ice fishing was indicated by seven respondents and skating by one.

(f) Use of other lakes. The users were asked whether they used other lakes in the area of the lake where they were staying. A majority 61.7 per cent, said yes. Thus, use is not confined to one lake only but also to surrounding lakes of the region.

(4) Destination Selection

(a) Main purpose of trip. Fishing and camping were the dominant (65.1 per cent) reasons for coming to the lake. Swimming also was high (10.1 per cent). A sizeable portion (12.8 per cent) of the respondents selected the "other" category. Their reasons included: (1) rest, (2) water-skiing, (3) diving, (4) multipurpose recreation, (5) relatives nearby. The four last reasons accounted for 0.7 per cent each of the reasons for the whole sample of 149 respondents. The "rest" category was therefore very important. To come to the lake for peace and quiet, to relax, fresh air, and to get away from it all were important primary reasons for 10.1 per cent of the respondents.

Table XLIX shows the main purpose of travelling to the lake campsite or resort.

TABLE XLIX

MAIN PURPOSE OF TRAVELLING TO THE LAKE FOR THE USERS

Purpose	Per cent of respondents
Fishing	38.3
Camping	26.8
Swimming	10.1
Picnicking	4.7
Business	2.0
Boating	1.5
Enjoy scenery	0.0
Other	12.8
Inadequate response	4.0

(b) Distance users willing to travel for fishing. Fifty-seven respondents listed fishing as their primary reason for visiting the particular lake where the interview took place. When asked how far they would be willing to drive one way for one day's fishing, their response was as shown in Table L.

TABLE L

DISTANCE FISHERMEN WILLING TO TRAVEL FOR ONE DAY OUTING

Distance	Per cent of fishermen
25 miles (1/2 hour)	7.0
50 miles (1 hour)	21.1
75 miles (1- 1/2 hours)	12.3

TABLE L (continued)

Distance	Per cent of fishermen
100 miles (2 hours)	38.6
150 miles (3 hours)	10.5
200 miles (4 hours)	5.3
Longer distance than 200 miles	1.8
Too short a period to travel for fishing	3.5

A 100 mile, or a two hour drive, was the most popular (38.6 per cent) distance selected to go fishing for one day.

For a weekend of two or three days of fishing, the users indicated the distance preferences in Table LI.

TABLE LI

DISTANCE FISHERMEN WILLING TO TRAVEL FOR WEEKEND

Distance	Per cent of fishermen
25 miles (1/2 hour)	1.8
50 miles (1 hour)	1.8
75 miles (1-1/2 hours)	5.3
100 miles (2 hours)	22.8
150 miles (3 hours)	36.8
200 miles (4 hours)	22.8
Longer distance than 200 miles	8.8

A distance of 150 miles, or a three hour drive, was the most popular. Distances of 100 miles and 200 miles were nearly equally popular and together was the preference of most of the users. In all, therefore, 82.4 per cent would drive between 100 and 200 miles for weekend fishing.

For a period longer than a weekend, the 25, 50, and 75 mile categories (in the questionnaire) were not selected. Responses for the remaining categories were as shown in Table LII.

TABLE LII

DISTANCE FISHERMEN WILLING TO TRAVEL FOR LONGER THAN WEEKEND

Distance	Per cent of fishermen
100 miles (2 hours)	10.5
150 miles (3 hours)	17.5
200 miles (4 hours)	22.8
300 miles (6 hours)	14.0
Longer distance than 300 miles	35.1

In the 300 mile or less categories, the most preferred distance was between 150 and 200 miles or a four hour drive. However, 150, 300, and 100 miles categories were selected quite often too. The most preferred distance indicated for any single distance category was 35.1 per cent who would drive a distance longer than 300 miles.

If this "longer distance" category is broken down further, for 24.6 per cent of the fishing respondents, time and money permitting, there is no limit as to how far they would travel to go fishing for a period longer than a weekend. Table LIII shows this break-down in detail.

TABLE LIII

DISTANCE OVER 300 MILES THAT FISHERMEN WILLING TO TRAVEL FOR LONGER THAN WEEKEND

Distance	Per cent of fishermen
350 miles (7 hours)	1.8
400 miles (8 hours)	3.5
500 miles (10 hours)	1.8
1,000 miles (20 hours)	1.8
1,500 miles (30 hours)	1.8
No limit (time and money permitting)	24.6

(c) Distance users willing to travel for camping. Camping involves an overnight stay and thus technically takes up at least two days. Thus, the distances users are willing to travel were examined for: (1) a weekend, (2) a period longer than a weekend.

For a weekend, the forty users indicating camping preference were willing to travel as shown in Table LIV.

TABLE LIV

DISTANCE CAMPERS WILLING TO TRAVEL FOR WEEKEND

Distance	Percent of campers
25 miles (1/2 hour)	7.5
50 miles (1 hour)	10.0
75 miles (1-1/2 hours)	5.0
100 miles (2 hours)	25.0
150 miles (3 hours)	27.5
200 miles (4 hours)	15.0
Longer distance than 200 miles	10.0

As found for the weekend preferences of the users who listed fishing as their main purpose of the trip, the 150 mile, or 3 hour drive, category was the most frequently stated by campers. Again, the 100 and 200 mile categories respectively were the next most frequently chosen.

For a period longer than a weekend, for 22.5 per cent of the respondents, 300 miles, or a six hour drive, is the most they are willing to travel. The 150 and 200 mile categories each received 12.5 per cent of the response. Seventy per cent were willing to travel 300 miles or more. The categorical breakdown is shown in Table LV.

A distance longer than 300 miles was indicated by 47.5 per cent of the respondents. This can be further broken down as shown in Table LVI.

TABLE LV

DISTANCE CAMPERS WILLING TO TRAVEL FOR LONGER THAN WEEKEND

Distance	Per cent of campers
25 miles (1/2 hour)	2.5
50 miles (1 hour)	0.0
75 miles (1-1/2 hours)	0.0
100 miles (2 hours)	2.5
150 miles (3 hours)	12.5
200 miles (4 hours)	12.5
300 miles (6 hours)	22.5
Longer distance than 300 miles	47.5

Thus, for 27.5 per cent of the respondents there is no limit, time and money permitting, to the distance they are willing to travel for camping over a period longer than a weekend.

TABLE LVI

DISTANCE OVER 300 MILES THAT CAMPERS WILLING TO TRAVEL FOR LONGER THAN WEEKEND

Distance	Per cent of campers
600 miles (12 hours)	2.5
1,000 miles (20 hours)	5.0
1,500 miles (30 hours)	7.5
2,000 miles (40 hours)	5.0
No limit (time and money permitting)	27.5

(d) Distance users willing to travel for picnicking. Only seven picnickers were interviewed. A majority were willing to travel only 25 miles or a one-half hour drive. No picnickers indicated willingness to travel further than 75 miles for this purpose. Table LVII indicates the percentages for each category.

TABLE LVII

DAY-USE DISTANCE PICNICKERS WILLING TO TRAVEL

Distance	Per cent of picnickers
25 miles (1/2 hour)	71.4
50 miles (1 hour)	14.3
75 miles (1-1/2 hours)	14.3

(e) Distance users willing to travel for swimming. Fifteen users interviewed indicated that the main purpose of their trip to the lake was swimming. As for picnicking, a distance of 25 miles is the preference of most swimmers. The distances are indicated in Table LVIII.

TABLE LVIII

DAY-USE DISTANCE SWIMMERS WILLING TO TRAVEL

Distance	Per cent of swimmers
Less than 25 miles (1/2 hour)	6.7
25 miles (1/2 hour)	73.3
50 miles (1 hour)	20.0

Eight of the fifteen respondents indicated that they would drive for a weekend or a longer period to a lake solely for swimming. For a weekend, only two indicated a distance greater than 50 miles and four for a period longer than a weekend.

(f) Distance users willing to travel for boating. Only two respondents indicated boating as their primary reason for visiting the lake. It is felt this response is too low to be of use as a main purpose. It is assumed that boating is incidental to some other activity mentioned above.

(g) Type of holiday. Most of the respondents (60.4 per cent) were on a vacation and another 20.1 per cent on a weekend trip (see Table LIX). The predominant reason listed in the "other reason" category was spending part of the day (e.g., afternoon, evening) at the lake.

TABLE LIX

TYPE OF HOLIDAY USERS WERE ON

Type of holiday	Per cent of respondents
Vacation	60.4
Weekend	20.1
Day off	8.7
Other reason	10.7

The users were further queried as to whether they came directly to the lake for fishing, camping, etc., or whether their stay at the lake was

just a stop-over on their holiday trip. A majority (81.9 per cent) stated that they came directly to the lake. The remaining 18.1 per cent of the users were stopping over.

(h) Opinion of gravel roads. Users were asked whether they felt that the gravelled roads in the area surrounding their chosen lakes required improvement . A majority (62.4 per cent) answered affirmatively and 35.6 per cent felt negatively. Two per cent of the respondents either did not respond or were not familiar with all the roads.

(5) Accommodation

At least one type of accommodation was used by 81.2 per cent of all respondents. Of these 81.2 per cent of the respondents, 19.0 per cent indicated the use of more than one type of accommodation and 81.0 per cent used only one type of accommodation. Tents, housetrailers, tent trailers, rental cabins, and truck campers accounted for the major (92.8 per cent) types of accommodation used by the single accommodation users. The respective percentages are shown in Table LX.

Trailer in the tabulation in Table LX is really a house trailer. Tent trailers have been categorized under "other" and can be broken down as shown in Table LXI.

A mobile home usually was a bus converted for living purposes. A camper trailer is similar to a tent trailer except that the sides are not canvas but of some solid material such as fiberglass.

TABLE LX

TYPE OF ACCOMMODATION USED BY THE SINGLE ACCOMMODATION USERS

Accommodation	Per cent of respondents
Tent	31.6
Trailer	20.4
Rental cabin	15.3
Hotel	1.0
Other	31.6

The users who chose more than one type of accommodation indicated choices as shown in Table LXII.

TABLE LXI

FURTHER BREAKDOWN OF "OTHER" CATEGORY IN TABLE LX

Accommodation	Per cent of respondents
Tent trailer	17.3
Truck camper	8.2
Mobile home	3.1
Camper trailer	1.0
Car	1.0
Open-air	1.0

Thus, of the users of more than one type of accommodation, 69.6 per cent used tents in addition to some other form of accommodation.

TABLE LXII

TYPE OF ACCOMMODATION USED BY THE MULTIPLE ACCOMMODATION USERS

Accommodation	Per cent of respondents
Tent	69.6
Trailer	47.8
Truck camper	34.8
Tent trailer	13.0
Mobile home	13.0
Rental cabin	13.0
Station wagon	8.7

(6) Campsite Facilities

(a) Preferences for developed and undeveloped campsites.

Respondents were asked whether they preferred to camp either in a developed area with camp shelters, toilets, well, towns nearby, and easy access to the site or in a wilderness or remote area with just a bare minimum in campground facilities, distant from settlement, with access more difficult. For a developed area, the response was:

Yes	79.2 per cent
No	19.5 per cent
No response	1.3 per cent

On the other hand, for a wilderness or remote area:

Yes	26.2 per cent
No	71.1 per cent
No response	2.7 per cent

In excess of 75 per cent of the users prefer developed campgrounds. However, a significant 25 per cent would like to camp in a wilderness or remote area. It should be noticed in this question the discrepancy between the 19.5 per cent who answered no to camping in a developed area and the 26.2 per cent who indicated they preferred a wilderness area. This would indicate that some people are uncertain as to just what type of campsite they prefer. It also could be a matter of double choice, dependent upon a number of factors.

(b) User rating of facilities at developed public campsites.

Users were asked about the quality of: (1) toilet facilities, (2) water supplies for drinking, (3) fireplaces or pedestal stoves, (4) kitchens, tables, shelters, (5) playground facilities for children. They were asked to rate each of the above as either: excellent, good, fair, or poor. Then in order to work with these verbal ratings mathematically, the author assigned numerical values to each (see Table LXIII).

TABLE LXIII

NUMERICAL VALUES ASSIGNED TO THE VERBAL RATINGS USERS USED TO RATE FACILITIES

Rating	Value
Excellent	1
Good	2
Fair	3
Poor	4
No such facility	5

The campsites open to the public were then examined in the light of the users' ratings. For example, for Alberta Provincial Park campsites, the toilet facilities were rated as excellent by six respondents, good by another six, and fair by one. The value of each rating was multiplied by the number of respondents who indicated the particular rating, viz:

1	(excellent)	multiplied by 6 (respondents)	=	6
2	(good)	multiplied by 6 (respondents)	=	12
3	(fair)	multiplied by 1 (respondent)	=	3
		Total	=	21

This total value (21) was then divided by the total number of respondents who rated the facilities (13) to derive the mean for that particular facility. If there was no such facility there, then a value of 5 was assigned per respondent. Five was chosen because it is a lower value than four for a poor rating. It is assumed that even if a campsite has a facility that is poor it is an improvement over a campsite that has no such facility. The above procedure was repeated for each of the four remaining facilities as listed above, such as water supplies for drinking, and so on. Then all the means were added up, divided by five, and rounded-off to a single digit. This then gave a numerical value rating for each type of campsite. Conversion back to a verbal rating can be done simply by referring to Table LXIII so that 1 is equal to excellent, and so on.

The users rated all the five types of facilities at government and private recreational areas open to the public. This is shown in Table LXIV.

TABLE LXIV

USER-RATING OF FACILITIES AT GOVERNMENT AND PRIVATE RECREATIONAL AREAS

Campsite	Raw numerical value rating	Rounded numerical value rating	Verbal Rating	Per cent of all respondents
Alberta Provincial Parks	1.78	2.0	Good	8.7
Municipal	2.48	2.0	Good	4.0
Forest Service	2.74	3.0	Fair	5.4
Department of Highways	2.80	3.0	Fair	44.3
Private	3.14	3.0	Fair	27.5

The two numerical ratings in Table LXIV should be explained. The final rounded numerical ratings are too coarse to differentiate enough between each of the campsites. For this reason the raw numerical ratings before rounding-off were put in to show to a finer degree the differences between the various campsites. For example, both Alberta Provincial Parks and municipal campsites are rated 2.0 and verbally interpreted "good." There is, however, a significant difference between the calculated ratings 1.78 for Alberta Provincial Park campsites and 2.48 for municipal campsites. Thus, Provincial Park campsites have been rated the highest by the users and private campsites the lowest. Municipal, Forest Service, and Department of Highways campsites have been placed quite closely together and appear after Provincial Park campsites but before private campsites in the ratings.

Boat launching facilities were rated as shown in Table LXV by the respondents at the various government and private recreational areas.

TABLE LXV

RATING OF BOAT LAUNCHING FACILITIES BY USERS

Campsite	Per cent of users who felt facility		
	Adequate	Inadequate	No response
Alberta Provincial Parks	76.9	23.1	0.0
Municipal	66.7	16.7	16.7
Forest Service	62.5	37.5	0.0
Department of Highways	39.4	47.0	13.6
Private	58.5	29.3	12.2

Users were especially dissatisfied with boat launching facilities at the Department of Highways campsites where boat launching facilities are seldom provided. It will be noted that the users were relatively satisfied (58.5 per cent) with the boat launching facilities at privately owned campsites.

(7) Expenditures

Respondents were asked to indicate their expenditures over the previous 24 hours in the area within approximately 15 - 20 miles of the lake they were using. The purpose of the question was to assess the spending in towns near lakes. Most of the lakeshore campsites are within 15 - 20 miles of a town or village, hence the reason for designating such a radius. As

stated earlier, there was an unfortunate error in the design of the question. Respondents, who were generally the male heads of the family, answered for the expenditures of the whole family rather than only for themselves. Difficulty was encountered in attempting to separate personal expenditures from those of the family. There is the possibility that some of the respondents only gave personal expenditures, thus the following expenditures per individual, including children, must be treated as a low estimate rather than a high estimate. It should be pointed out also that users living within the 15 - 20 mile radius of a lake often found it difficult to separate expenditures for recreation from those for normal home living. Such data were not used in calculating the expenditure below.

From the response of seventy-five users who stated they were with their families, a mean spending of $2.50 per individual per day was calculated. All members of the family were taken into consideration. For respondents who indicated that they were with a party of people it was even more uncertain whether the expenditures listed were for the individual, the one family only within a party, or the whole party. However, mean individual daily spending calculated for all members in the party ($2.56) was very close to that of the above individual family spending. Thus, it would appear that the expenditure per individual campsite and summer resort user is somewhere in the neighborhood of $2.50 per day.

In summary, then, the users of the campsites and summer resorts in the study area came from Edmonton, from within the region, and from areas to the immediate south and southwest of the region. Only a small percentage of the users are from outside Alberta. In terms of age, occupation, and income, the users tended to be from the middle categories (e.g., 43.0 per cent of the users had incomes between $5,000 and $7,501). Most of the recreationists, while on their holiday trip, come directly to the lake for fishing, camping, swimming, or resting. Most tended to visit the lake only once or twice during the summer while also visiting the surrounding lakes as well. Ownership of a boat was very common and the possibility of angling in a lake was a very important attraction for the recreationists. A majority of the respondents were travelling with their families. Stays of one to three days were the most common. The major types of accommodation used were tents, house trailers, tent trailers, rental cabins, and truck campers. On the average, it would appear that the expenditure per individual user was around $2.50 per day. Roughly seventy-five per cent of the users preferred developed campgrounds, and felt that facilities in the Alberta Provincial Park and municipal campsites were good. Forest Service, Department of Highways, and private campsites were rated fair. On the whole, very little winter use was indicated within the region.

CHAPTER VII

ANALYSIS OF COTTAGE USER DATA

The data from the 274 respondents in the cottage user study in the total region will be analyzed under the following headings: (1) cottage owner hinterland, (2) socio-economic characteristics, (3) travel habits, (4) location, site selection for the cottage, (5) other information concerning the cottage, (6) recreational activities enjoyed while at the cottage, (7) expenditures while at the cottage.

The socio-economic characteristics examined are: sex, age, occupation, and annual income. Under travel habits the type of transportation used in reaching the cottage, the time spent in driving, and the distance cottagers are willing to drive to a cottage, are included. In the location and site selection the cottagers' views are concerned with: (1) why the particular lake was choosen for a cottage, (2) lake size preference, (3) importance of sport fish in lake, (4) lake shortcomings since original location, (5) ownership of lot, (6) why particular cottage site was selected on the lake, (7) site problems after cottage location, (8) importance of seclusion to the cottager. Then data concerning the cottage will be discussed, e.g., (1) age of cottage, (2) length of time cottage owned, (3) whether cottage is leased, (4) whether own cottage(s) elsewhere in Alberta, (5) use of cottage for both summer and

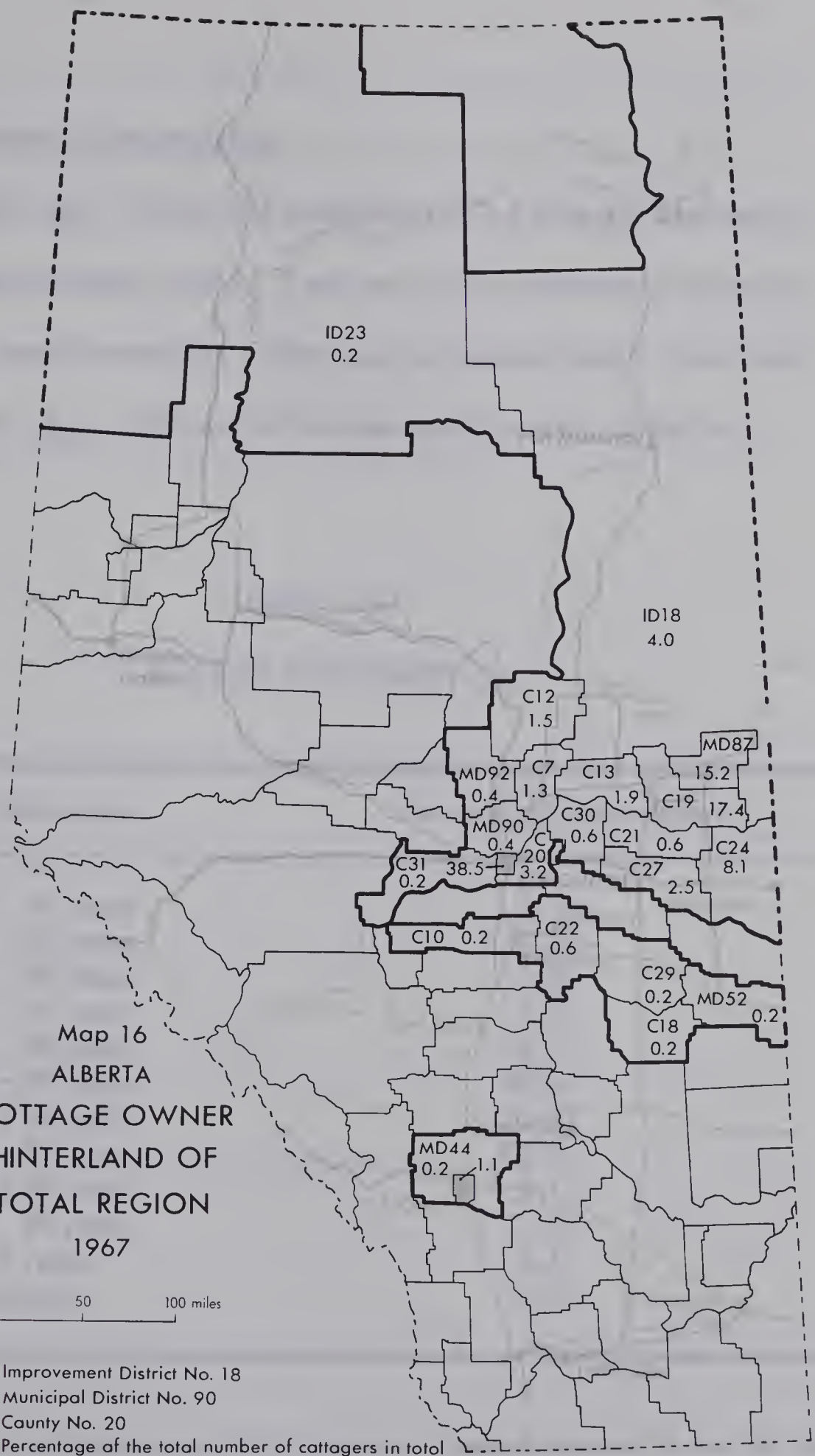
winter recreational acitivites.

(1) Cottage Owner Hinterland

The addresses of 528 cottagers within the total region were used to define the hinterland (Map 16). Cottagers whose addresses were wrong, addresses of sites where there was no cottage, and where the cottage had been sold (unless new address was given) were omitted in the compilation of the map. The remaining cottagers were then used in the demarcation of the hinterland.

As with the campsite and summer resort users, Edmonton was the primary source of cottage owners -- 38.5 per cent. Approximately 37 per cent of the cottagers lived within the region itself. The major portion of the remaining 24.5 per cent came from the area immediately to the west and south of the region. Only 1.3 per cent of this group came from Calgary and Municipal District No. 44 which surrounds Calgary. Forty-three cottagers (8.1 per cent) came from County No. 24 and seven were from Lloydminster. Only 1.6 per cent of the cottagers were from outside Alberta and these were all from within Canada. The cottage owner hinterland of total region is much less extensive than that for the campsite and summer resort user.

The greatest number of recreational users of the lake shorelands coming from outside the total region were primarily from Edmonton. To a less extent they came too from the area immediately to the south and west of the study area.



Map 16

ALBERTA

COTTAGE OWNER HINTERLAND OF TOTAL REGION

1967

ID18 Improvement District No. 18
MD90 Municipal District No. 90
C20 Caunty No. 20
38.5 Percentage af the total number of cattagers in totol region that come fram particular municipolity ar pravince

British Columbia — 0.6% Saskotchewan — 0.4% Ontario — 0.4% Monitabo — 0.2%



(2) Socio-economic Characteristics

(a) Sex. Of the 274 respondents, 73.4 per cent were male, 13.9 per cent were female, and 11.7 per cent of the respondents indicated joint male and female ownership. There was no response from 1.1 per cent.

(b) Age. The ages of the respondents were as shown in Table LXVI.

TABLE LXVI

AGES OF COTTAGERS

Age group	Per cent of respondents
20 - 24 years	0.4
25 - 29 years	3.3
30 - 34 years	5.8
35 - 39 years	9.5
40 - 44 years	18.2
45 - 49 years	20.4
50 - 54 years	16.8
55 - 59 years	10.2
60 - 64 years	5.1
65 - 69 years	1.5
70 + years	4.4
No reply	4.4

A majority of the cottage owners (75.1 per cent) were between 34 and 60 years of age.

(c) Occupation. Almost sixty per cent of the cottage owners

comprised three occupational categories: (1) managerial, (2) professional and technical, (3) craftsmen, production process and related workers. Six of the seven respondents (2.6 per cent) in the "farmers and farm workers" category were operators, the remaining respondent was a landscaper. Only one cottage owner was a labourer. In addition, only a small percentage (5.1) of the cottage owners were retired. Table LXVII illustrates the percentage of respondents in all occupations.

TABLE LXVII

OCCUPATIONS OF COTTAGERS

Occupation	Per cent of respondents
Managerial	25.9
Professional and technical	19.0
Clerical	4.0
Sales	4.7
Service and recreation	3.3
Transport and communication	2.9
Farmers and farm workers	2.6
Craftsmen, production process and related workers	12.0
Labourers	0.4
Retired	5.1
Housewives	8.8
Inadequate response	8.8
No reply	2.6

(d) Annual family income. A majority of the respondents (74.5 per cent) listed annual incomes over $5,000. A significant number (14.6 per cent) were in

the "$2,501 to $5,000" category. Only 3.6 per cent of the respondents had incomes less than $2,501. On the other hand, it should be noted that 3.6 per cent of the respondents had incomes of more than $20,000. The exact percentage of respondents in each income range is as shown in Table LXVIII.

TABLE LXVIII

ANNUAL FAMILY INCOME OF COTTAGERS

Income range	Per cent of respondents
$ 2,500 or less	3.6
$ 2,501 to $ 5,000	14.6
$ 5,001 to $ 7,500	30.7
$ 7,501 to $10,000	20.8
$10,001 to $12,500	7.7
$12,501 to $15,000	6.6
$15,001 to $17,500	2.2
$17,501 to $20,000	2.9
More than $20,000	3.6
No reply	7.3

(e) Family. Almost all cottage owners had a family -- 94.9 per cent. A small portion (4.4 per cent) reported no families and there was a no response rate of 0.7 per cent.

(3) Travel Habits

(a) Transportation used. Cottagers were asked to indicate the type of transportation used to reach the cottage from their home. Table LXIX shows

for each type of transportation the percentage of the total number of respondents who indicated they used that type. Cottagers could have checked more than one type of transportation. There was no response from 2.2 per cent on this question.

TABLE LXIX

TRANSPORTATION COTTAGERS USED TO REACH COTTAGE

Transportation	Per cent of respondents
Car	96.4
Truck	14.6
Bus	1.5
Train	1.1
Airplane	1.1
Other	0.4

As should be expected, car and truck were the most prevalent means of transportation used to reach the cottage.

(b) Time spent in driving. As to how long it took the cottager to reach the cottage, order is indicated by Table LXX. For 89.1 per cent of the respondents it took three hours or less to reach the cottage. For a large portion of the respondents (32.5 per cent) it took only a half hour or less. If a distance of fifty miles is allowed for each hour spent driving, then few cottagers drove more than 150 miles to their cottage and one third of them drove

twenty-five miles or less.

TABLE LXX

TIME COTTAGERS SPENT DRIVING TO COTTAGE

Time	Per cent of respondents
0 - .5 hours	32.5
.6 - 1.0 hours	5.1
1.1 - 1.5 hours	13.5
1.6 - 2.0 hours	17.9
2.1 - 3.0 hours	20.1
3.1 - 4.0 hours	4.4
4.1 - 5.0 hours	0.0
5.1 - 6.0 hours	0.4
6.1 - 7.0 hours	0.4
7.1 - 8.0 hours	1.1
No reply	4.7

(c) Distance cottagers willing to drive. Cottagers were queried as to how far they would be willing to drive (one way) to a cottage located on a site with a high recreational potential (i.e., small beach for bathing and swimming, good vegetative cover, clean water, no weeds offshore, good access to water, etc.). Their response was as shown in Table LXXI. For most cottagers (84.3 per cent) distances up to 150 miles or a three hours drive is acceptable. Another 6.6 per cent of the cottagers indicated that they would be willing to drive up to 200 miles or a four hour drive. Only 2.3 per cent of the respondents were willing to drive more than 200 miles to reach a cottage.

TABLE LXXI

DISTANCE COTTAGERS WILLING TO DRIVE
ONE WAY TO A COTTAGE

Distance	Per cent of respondents
25 miles (1/2 hour)	20.8
50 miles (1 hour)	13.1
75 miles (1-1/2 hours)	11.7
100 miles (2 hours)	23.0
150 miles (3 hours)	15.7
200 miles (4 hours)	6.6
250 miles (5 hours)	0.4
300 miles (6 hours)	0.0
350 miles (7 hours)	0.0
400 miles (8 hours)	1.5
Longer distance or time	0.4
No reply	6.9

(4) Location, Site Selection

(a) Choosing a lake. Cottagers were asked why they selected as a place to purchase or build their cottage the particular lake on which their cottage is located. They were also asked to rank their answers to indicate priority. Six reasons were listed plus another category for other reasons. Thus, they had seven reasons to rank using 1 for the most important reason, 2 for the second most important, and so on. For the "natural beauty of lake" reason for example, 82 respondents ranked it as 1, 50 as 2, 27 as 3, 10 as 4, 5 as 5, 1 as

6, 1 as 7. For analytical purposes each numerical rank (e.g.,"1") was multiplied by the number of respondents (e.g.,82) who used it. For example:

1 (1st rank) multiplied by 82 (respondents)	=	82
2 (2nd rank) multiplied by 50 (respondents)	=	100
3 (3rd rank) multiplied by 27 (respondents)	=	81
Continued to seventh rank		
Total	=	341

The total, 341, was then divided by the total number of respondents (176) who ranked the "natural beauty of lake" reason. The resulting answer, 1.9 is a numerical basis for ranking the "natural beauty of lake" reason. The same was done with other reasons given -- see Table LXXII. Thus, the lower the value (e.g.,1.9) the more important the reason. "Natural beauty of lake" was ranked first, with "fishing" second, "convenience" third, "good water quality" fourth, "other reasons" fifth, "close to an excellent transportation route" sixth, and "size of lake" seventh. The "other reasons" category was made up of very many diverse reasons. The only reason in the "other" category that seemed significant centered on the theme of: "privacy," "remoteness," "quiet and peaceful," "not crowded," and "not commercialized." This reason was mentioned by approximately thirty per cent of the 30.6 per cent of the respondents who ranked their reasons. "Closeness to friends" was also mentioned often (approximately eight per cent of the 30.6 per cent).

(b) Lake size preference. Cottagers were queried as to what lake size, i.e., area of the water-body they would prefer for location of their cottage. Table LXXIII indicates their responses to the various suggested sizes.

TABLE LXXII

REASONS FOR SELECTING LAKE

Reasons	Rank	Per cent of all respondents who ranked reasons	Per cent of all respondents who only checked reasons	Per cent no response of all respondents
Natural beauty of lake	1.9	64.2	15.7	20.1
Fishing	2.6	60.6	12.4	27.0
Convenience (close to home)	2.9	47.5	10.2	42.3
Good water quality	3.4	43.7	5.5	50.7
Other reason(s)	3.6	30.6	9.9	59.5
Close to an excellent transportation route	3.9	39.1	5.1	55.8
Size of lake	4.3	38.7	4.4	56.9

TABLE LXXIII

COTTAGERS' LAKE SIZE PREFERENCES

Lake size	Per cent of respondents
5 or less square miles	23.0
6 - 20 square miles	47.4
21 - 50 square miles	7.3
51 + square miles	14.6
No reply	7.7

Almost fifty per cent of the respondents preferred a lake size somewhere in the "6 - 20 square miles" category. Almost a quarter of them selected the "5 or less square miles" category. Thus, most respondents (70.4 per cent) prefer smaller lakes as opposed to larger sized lakes.

(c) Importance of sport fish in lake. Cottagers' opinions were sought concerning the importance of sport fish in regard to cottage location. Asked if there were no fishing available in their lake, would the boating, swimming, and other recreational assets of the lake warrant their owning a cottage on it, a sizeable portion (27.4 per cent) answered "no," while 68.6 per cent stated "yes" and 4.0 per cent did not reply. It will be recalled that fishing was of greater importance to the campsite and summer resort users. There 49.0 per cent said they would not come if there were no fish and 50.3 per cent said they would come.

(d) Lake shortcomings since location. It was presumed that some cottagers might have found problems with the lake on which their cottage was located, since locating a cottage there. Seventy-seven (28.1 per cent) of all respondents had no criticism of the lake. The remaining 71.9 per cent found problems, the importance of which they ranked. A numerical rank was calculated in similar fashion as previously done in the case of reasons for location on a particular lake. Table LXXIV illustrates this importance ranking. All calculations are based on the 197 respondents (71.9 per cent) who stated they had encountered problems. The three most important problems in order of significance were: (1) severe algal bloom, (2) too weedy, (3) lake gets too rough for family boating. In the "other problem" category no single criticism stood out; rather each respondent appeared to have a unique problem (e.g., taxes too high, water level of lake going down, shoals in lake, vandalism, so on).

(e) Ownership of cottage lot. Table LXXV shows the ownerships of the lots on which the cottages are located. Approximately two-thirds of the respondents owned their lots. A significant percentage (18.2) of them leased them from the Government. Thus, Government Authorities have a direct influence on a certain percentage of the cottagers as to where they locate their cottages.

TABLE LXXIV

PROBLEMS WITH LAKE WHERE COTTAGE LOCATED

Problems	Rank	Per cent of 197 respondents who: ranked problems	only checked problems	had no response
Severe algal bloom	1.4	43.1	15.2	41.6
Too weedy	1.8	37.1	11.7	51.3
Lake gets too rough for family boating	2.1	18.2	4.6	77.2
Lake is too intensively used for its size	2.5	17.1	6.1	76.6
Other problem(s)	2.5	11.2	14.7	74.1
No fish	3.2	14.6	2.0	83.2

TABLE LXXV

OWNERSHIP OF COTTAGE LOT

Ownership	Per cent of respondents
By the cottager(s)	66.4
Leased from another property owner	14.2
Leased from the Government	18.2
No reply	1.1

(f) Site selection on lake for cottage. Cottagers were further questioned as to why they selected a particular site on their lake. Once again they were asked to rank their reasons. Table LXXVI is a summary of the responses. The five most important reasons listed in order of significance for selecting a particular cottage site on the lake were: (1) view, (2) sandy beach, (3) good vegetative cover (e.g., twenty feet or over in height, providing shade), (4) vehicle access not difficult in summer (i.e., May to October), (5) ease of access to water from shore (e.g., seven to fifteen per cent slopes). Being "sheltered from the wind," and "no weeds offshore" were of equal importance and came after the above five reasons. After these two reasons came two other reasons with equal ranking: (1) only site available on lake, (2) offshore gradient (i.e., one to five per cent) suitable for swimming and bathing. Then followed reasons such as: "firm offshore bottom," "exposure to sun," "well-drained backshore," and others.

(g) Site problems after cottage location. In reply to whether or not they found any problems with the particular site where their cottage

TABLE LXXVI

REASONS FOR SELECTING PARTICULAR COTTAGE SITE ON LAKE

Reasons	Rank	Per cent of all respondents who: ranked reasons	only checked reasons	had no response
View	3.0	50.4	13.9	35.8
Sandy beach	3.3	37.6	10.2	52.2
Good vegetative cover (e.g., 20 plus feet high)	4.1	34.3	10.6	55.1
Vehicle access not difficult May to October	4.5	44.2	13.1	42.7
Ease of access to water from shore (e.g., 7-15 per cent slopes)	4.7	31.8	9.1	59.1
No weeds offshore	5.3	27.4	6.2	66.4
Sheltered from wind	5.3	31.8	9.9	58.4
Offshore gradient (i.e., 1 - 5 per cent) suitable for bathing	5.5	28.8	8.4	62.8
Only site available on lake	5.5	19.7	4.0	76.3
Firm offshore bottom	5.7	29.6	8.8	61.7
Exposure to sun	6.3	24.8	5.8	69.3
Well-drained backshore	6.5	21.2	5.8	73.0
Other reason(s)	6.7	15.0	6.2	78.8
Vehicle access not difficult November to April	7.3	20.4	6.2	73.4
Fresh water availability	7.8	18.6	7.7	73.7
Steep offshore gradient (i.e., 15 per cent plus) suitable for beaching boats, etc.	8.2	13.5	4.0	82.5
Proper soil materials for foundations, etc.	8.7	13.9	4.4	81.8
Cobble (rounded four inches-in-diameter rocks) beach	12.2	6.9	1.5	91.6

was located, 33.2 per cent of the respondents said they encountered no problems. Table LXXVII illustrates the responses of the remaining 66.8 per cent (183 respondents). Cottagers were asked to rank their problems. The five most serious problems encountered in order of significance were as follows: (1) offshore too weedy, (2) no fresh water available, (3) vehicle access difficult in winter (i.e., November to April), (4) mucky and soft offshore bottom, (5) serious insect infestation. "Present lot is too small" and "foreshore too rocky" were rated as next most serious. "Vehicle access difficult in summer (i.e., May to October)" and "access to water from shore difficult" were also quite serious problems.

(h) Importance of seclusion to the cottager. In response to a question concerning seclusion, the cottagers made the responses shown in Table LXXVIII to alternatives as to where else they would have preferred to own a cottage.

TABLE LXXVIII

IMPORTANCE OF SECLUSION TO THE COTTAGER

Alternatives	Per cent of respondents
In an organized summer village or lake association	10.6
Near other cottages but not in a tightly organized summer village	40.9
Not in a tightly organized summer village and reasonably isolated from other cottages (e.g., isolated by 100 yards of vegetation or being separated by a point, etc.)	36.1
Remotely secluded (e.g., no other cottages within 1/2 mile)	5.8
No reply	6.6

TABLE LXXVII

PROBLEMS WITH COTTAGE SITE ON LAKE

Problems	Rank	Per cent of 183 respondents who: ranked problems	only checked problems	had no response
Offshore too weedy	2.1	26.8	6.0	67.2
No fresh water available	2.3	21.9	9.3	68.9
Vehicle access difficult November to April	2.5	15.3	4.9	79.8
Mucky and soft offshore bottom	2.6	14.8	4.9	80.3
Serious insect infestation	2.7	16.4	3.3	80.3
Foreshore too rocky	3.1	8.2	0.5	91.3
Present lot is too small (i.e., need more space)	3.1	9.3	2.7	88.0
Vehicle access difficult May to October	3.4	5.5	1.1	93.4
Access to water from shore difficult	3.6	7.7	1.6	90.7
Other problem(s)	4.4	6.0	6.0	88.0
Backshore not well-drained	4.8	6.0	1.6	92.3
Traffic noise	5.2	6.6	2.7	90.7
Site too exposed to wind	5.3	7.1	3.3	89.6
Unstable soil materials	5.6	6.0	1.6	92.3
Poor or no vegetative shade cover	5.7	6.0	1.1	92.9
Offshore gradient too shallow (i.e., 1-5 per cent)	5.9	4.4	1.1	94.5
Offshore gradient too steep (i.e., 15 per cent plus)	6.4	3.8	1.1	95.1
Poor view	6.7	4.9	1.1	94.0

Few cottagers (5.8 per cent) wanted to be totally secluded. On the other hand, only 10.6 per cent wanted to own a cottage in an organized summer village or lake association. Seventy-seven per cent of the respondents wanted something in between--either near other cottages but not in a tightly organized summer village, or not in a tightly organized summer village and reasonably isolated from other cottages.

(5) Cottage

(a) Age of cottage. As shown by the tabulation in Table LXXIX, a large majority (76.6 per cent) of the cottages had been built in the nine years prior to 1968.

TABLE LXXIX

AGE OF COTTAGE

Age of cottage	Per cent of respondents
0 - 3 years	20.8
4 - 6 years	32.8
7 - 9 years	23.0
10 - 14 years	9.9
15 - 20 years	6.9
21 - 30 years	3.6
31 + years	2.2
No reply	0.7

(b) Length of time cottage owned. Cottagers responded as tabulated in Table LXXX, concerning the length of time they had owned their cottage.

TABLE LXXX

LENGTH OF TIME COTTAGE OWNED

Length of time	Per cent of respondents
0 - 3 years	31.0
4 - 6 years	32.1
7 - 9 years	19.0
10 - 14 years	9.5
15 - 20 years	4.7
21 - 30 years	1.5
31 + years	1.5
No reply	0.7

The seven "age of cottage" categories were correlated with the seven "length of time cottage owned" categories. The per cent of respondents to each of the categories were used in the correlation. A simple correlation coefficient of 0.94 was obtained. Thus it would appear that once a cottager builds a cottage it is kept for a long period of time before it changes hands.

(c) Whether cottage is leased. Ninety-six per cent of the cottagers said they did not lease their cottage to anyone else during the year. The remainder did.

(d) Whether own cottage(s) elsewhere in Alberta. In response to a question concerning the ownership of a cottage(s) on any other lake(s) in Alberta, 95.6 per cent of the respondents said "no." A small percentage, 2.2 per cent, did. There was no response from 2.2 per cent.

(e) Seasonal use of cottage. Almost every respondent (97.8 per cent) used his or her cottage during the summer. There was no response from 1.8 per cent. Cottagers were asked to indicate whether they used the cottage: (1) all summer, (2) a few weeks only, (3) weekends, (4) 1 - 2 days each week, (5) less than 1 day each week. More than one choice could have been picked. There was a no response rate of 1.8 per cent for each choice and the responses were as shown in Table LXXXI.

TABLE LXXXI

SUMMER USE OF COTTAGE

Summer use	Per cent of respondents
All summer	35.0
A few weeks only	27.7
Weekends	47.4
1 - 2 days each week	13.1
Less than 1 day each week	4.4

Winter use was indicated by 44.2 per cent of the respondents. There was no response from 1.5 per cent. Cottagers were given the same choices for winter use as for summer use and their responses were as shown in Table LXXXII with a no response rate of 6.2 per cent per choice.

Thus, during the summer, many cottagers (35.0 per cent) used the cottage all summer. No cottager indicated using the cottage all winter. During the summer the respondents indicated much use of the cottage for a

period of a few weeks only and also on weekends. Few cottagers (4.4 per cent) used their cottage for a period of a few weeks during the winter. Winter use was confined largely to weekends and periods of less than one day each week. Thus, though there is a sizeable amount of winter use, the intensity of use during the winter is much less than during the summer when, for example, 35.0 per cent of the cottagers used the cottage all summer. The severity of the winter climate, as discussed in Chapter II, is probably the key factor in this sparse use.

TABLE LXXXII

WINTER USE OF COTTAGE

Winter use	Per cent of respondents
All winter	0.0
A few weeks only	4.4
Weekends	17.5
1 - 2 days each week	1.8
Less than 1 day each week	17.5

(6) Recreational Activities

(a) Summer recreational activities. Cottagers were given a list of predominantly summer recreational activities and asked to indicate which they or their family engaged in while at the cottage. There was a no response rate of 0.7 per cent for each recreational activity. Table LXXXIII illustrates the cottagers' responses.

TABLE LXXXIII

SUMMER RECREATIONAL ACTIVITIES ENJOYED
WHILE AT THE COTTAGE

Recreational activities	Per cent of respondents
Fish	94.9
Boat	93.8
Swim	93.1
Water-ski	65.3
Picnic	63.9
Photography	50.7
Hike	47.1
Sight-see	42.3
Hunt	35.8
Camp	35.0
Golf	14.2
Scuba dive	9.1
Others	23.4

Over ninety per cent of the respondents fished, boated, and swam. Water-skiing, picnicking, and photography were done by over fifty per cent of the respondents. Table LXXXIV shows the breakdown of the "other(s)" category.

The percentages shown in Table LXXXIV do not add up to 23.4 per cent of the "other(s)" category in previous tabulation because some respondents were listed once for every reason they put down. Resting, berry picking, and entertaining were the most important recreational activities in the "other(s)" category.

All the above recreational activities were done by 82.1 per cent of the respondents at the lake where the cottage was located. Some respondents

(10.6 per cent) indicated going elsewhere in the region to satisfy some of the above activities. A small portion of them (4.4 per cent) indicated going either inside the region or outside it to satisfy some of the above activities.

TABLE LXXXIV

FURTHER BREAKDOWN OF "OTHER(S)" CATEGORY FROM TABLE LXXXIII

Recreational activities	Per cent of respondents
Rest	4.7
Berry picking	4.0
Entertain	4.0
Horseback riding	1.8
Nature study	1.8
Doing own construction	1.5
Visiting	1.5
Horseshoes	1.5
Barbecue	1.5
Gardening	1.1
Others	9.1

A large majority (80.3 per cent) indicated that they owned a boat. Nineteen per cent said that they used a friend's or relative's boat when at the cottage. A small percentage (2.9 per cent) rented a boat when at the cottage. Four respondents (1.5 per cent) did not reply to the question. It was hence assumed that they did not own or use a boat when at the cottage. There was a no response rate of 2.2 per cent. The cottagers could have checked more than one answer.

(b) Winter recreational activities. Winter recreational activities were those done at the cottage during the months of November to April inclusive. In the following tabulation (Table LXXXV), the percentages are based only on those respondents indicating winter use of the cottage.

TABLE LXXXV

WINTER RECREATIONAL ACTIVITIES
ENJOYED WHILE AT THE COTTAGE

Recreational activities	Per cent of respondents
Ice fishing	66.1
Power tobogganing	33.1
Hunting	14.0
Skating	10.7
Tobogganing and sleighing	7.4
Skiing	5.8
Social gatherings	3.3
Hiking	2.5
Relaxing	2.5
Other(s)	2.4

Ice fishing and power tobogganing were the two most popular winter recreational activities for the respondents.

(7) Expenditures

Cottagers were asked to estimate their expenditures during the summer of 1967 in an area within approximately 15 - 20 miles of their cottages. The purpose of the question was as for the campsite and summer resort user survey mentioned previously. If shopping was done in the nearest town that was further than 15 - 20 miles, then the cottagers were asked to use it in calculating their expenditures. As with the campsite and summer resort user study, cottagers with their permanent residence within 15 - 20 miles of the cottage were not used in the expenditure calculations. Of the 274 respondents, 152 were used in arriving at a mean expenditure of $463.84 per cottager during the summer of 1967.

In summary, then, 73.4 per cent of the 274 cottage owners were male, 13.9 per cent female, and 11.7 per cent indicated joint male and female ownership. A majority of them (75.1 per cent) were between 34 and 60 years of age. Almost sixty per cent of the owners were of one of three occupational categories: (1) managerial, (2) professional and technical, (3) craftsmen, production process and related workers. Almost seventy-five per cent of the respondents listed annual family incomes over $5,000 and almost all (94.9 per cent) had a family. The car and truck were the most important means of transportation used to reach the cottage. For 89.1 per cent of the respondents, it took three hours or less to reach their cottage. Most (84.3 per cent) would be willing to drive up to 150 miles or a three hour drive to a cottage located on a site with a high recreational potential.

The three most important reasons for choosing a particular lake for a cottage were in order of importance: (1) natural beauty of lake, (2) fishing, (3) convenience (close to home). Most respondents (70.4 per cent) preferred lakes less than twenty-one square miles in water area. A sizeable portion of them (27.4 per cent) indicated they would not own a cottage on the lake if there were no fish in it. As for the most serious problems encountered by respondents with the lake where their cottages are located, the three most important were: (1) severe algal bloom, (2) too weedy, (3) lake gets too rough for family boating.

Approximately two-thirds of the respondents owned their lots. The remainder leased them either from the government or another property owner. The five most important reasons listed in order of significance for selecting a particular cottage site on the lake were: (1) view, (2) sandy beach, (3) good vegetative cover, (4) vehicle access not difficult in summer, (5) ease of access to water from shore. On the other hand, the five most serious problems encountered with the cottage site were in order of priority: (1) offshore too weedy, (2) no fresh water available, (3) vehicle access difficult in winter, (4) mucky and soft offshore bottom, (5) serious insect infestation. Seventy-seven per cent of the respondents wanted a cottage in not a tightly organized summer village and either near other cottages or moderately isolated from other cottages.

A large majority of the cottages had been built in the nine years prior to 1968. It also appears that once a cottager builds a cottage, he or she keeps it for a long period of time before it changes hands. Ninety-six per cent of the respondents said that they did not lease their cottage. Only a little over two per cent of the respondents had an additional cottage. Almost every respondent used the cottage during the summer, and thirty-five per cent of them used it all summer. Also, during the summer much use of the cottage was made for periods of a few weeks only and for weekends. Winter use was indicated by only 44.2 per cent of the respondents, and was confined largely to weekends and periods of less than one day each week. During the summer, over ninety per cent of the respondents fished, boated, and swam. Water-skiing, picnicking, and photography were done by over fifty per cent of the respondents. Approximately eighty-two per cent of the cottagers said that all their summer recreational activities were accomplished at the lake where the cottage was located.

A large majority of the respondents (80.3 per cent) indicated that they owned a boat. Ice fishing and power tobogganing were the most popular recreational activities of winter users. Of the 274 respondents, 152 were used in arriving at a mean expenditure of $463.84 per cottager during the summer of 1967 within 15 - 20 miles of the cottage.

CHAPTER VIII

CONCLUSION

From the research conducted for this study and the analysis of the data some conclusions can be drawn. From a recreational standpoint, inadequacies in present land use and transportation facilities in the sub-region will be briefly discussed. A concluding comment will be made concerning the influence of the climate on the future recreational use of the lakes. The high capability lakes for recreation as have become obvious from the application of the modified CLI system will be highlighted again. Observed disparity between the assessed recreational potential of these lakes and their current recreational use is also worthy of comment. An argument will be made for the continuing revision of the CLI subclasses in the light of user surveys of the kind made here. In addition, a plea will be made for a regional approach to planning and development of not only recreational resources but the total resources of the area. From the recreational standpoint some further research can certainly contribute to the soundness of this type of planning. A number of suggestions for this needed research will conclude the discussion.

Through the course of this study, a number of inefficiencies in the present agricultural and transportational land use in the sub-region have become obvious. Farmers in the area have a tendency to fell trees down to the

water's edge, and to clear land by firing. As was shown earlier, this results in the loss of shade cover which recreationists desire. Because of increased water run-off, this perhaps also helps to speed up the nitrogenous pollution of lakes from fertilizers used on the surrounding agricultural land and contributes to a more severe algal bloom. There also seems to be occurring a slow erosion of the Green Area boundary. For example, near Elinor Lake, encroachments into the present Green Area have begun.

A number of inadequacies were also observed in the transportational land use. For example, many roads of an all weather standard, are constructed parallel to the waters' edge of a lake. This, in some cases (e.g., Fork Lake) ruins the possibility of use of hundreds of linear feet of lake shoreland for recreational purposes because of dust, traffic noise, traffic hazard to pedestrians, and lack of space for development. Maintenance of the gravelled roads too, could be improved. This was shown in the campsite and summer resort user study and perceived during the course of the field work. Also currently, an all weather road is being built to Seibert Lake from the south. It is possible that a road will be built between Seibert and Pinehurst Lakes, northwest through the Helena, Blackett, Kinnaird, Jackson chain of lakes to Lac La Biche. The intentions of such a scheme are commendable--to open up to the public many presently inaccessible lakes (Jackson, Kinnaird, Blackett, Dabbs, McGuffin, Shaw, Brown, and Helena Lakes). Unfortunately, the building of such a road would ruin the possibility of providing recreationists with a multipurpose water-oriented recreational area near the settled areas.

Climatically for man, the study area offers two extremes, a severe winter and a warm summer. During the winter, the climate is very cold, and far from ideal from the standpoint of human comfort. Climatic hindrance to outdoor recreational use is very pronounced. However, as shown in the user studies, some recreationists do partake in winter recreational activities such as ice fishing, power tobogganing, hunting, skating, and so on. On the other hand, the summer climate is nearly ideal for man. Thus, future recreational use of the lakes in the area will almost certainly continue to be of a seasonal nature, with intensive use of them during summer, and less intensive use during winter. However, there is a growing popularity of power tobogganing. These vehicles allow access into areas previously inaccessible in any season to a motorized vehicle normally used by recreationists. Thus, winter use certainly could increase substantially in the future.

The modified version of the CLI system used to analyze and map the recreational shoreland capability of the lakes in the sub-region, divides more finely, Class 1B and Class 2B areas. This modification enables the mapping of shorelands in greater detail and thus the classification can be of more value for future planning in the area. The top fifteen lakes listed in order of importance has already been suggested. The very high recreational capability of these lakes is illustrated in Chapter III. Cold Lake, for example, has eight Class 1+B units and three 1-B units.

There is, however, lack of coincidence between the location of

the high capability units (e.g., Class 1+B) on the above lakes (see Maps 8, 9, and 10), and the location of the operating government recreational areas (see Map 12). Cold and Marie Lakes will be used to illustrate this point. The eastern shore of Cold Lake is a part of Saskatchewan's Meadow Lake Provincial Park. Unfortunately, because of the prevailing west and south-west winds at Cold Lake, the Saskatchewan portion of the Cold Lake shore suffers from exposure to these winds. On the other hand, the Alberta shores of Cold Lake are less exposed to wind. Furthermore six of the eight Class 1+B units and one Class 1-B unit are on the Alberta shore. Two of the 1+B units are on crown land and two are on private land. Of the remaining two 1+B units, one is predominantly in private hands, and one-half of the other is publicly owned. The Class 1-B unit is nearly all privately owned. Of the two crown owned 1+B units only one has a campsite. The Department of Highways English Bay campsite (middle west shore of Cold Lake) is on the above Class 1+B that is only one-half publicly owned. Use of this campsite by recreationists from the Cold Lake Air Base is very intensive. In the light of the high capability of these beaches on Cold Lake and of the intensive use that the one developed Class 1+B does get, it would seem that future development should take place on these Class 1B units. Furthermore, Alberta recreational authorities might be advised to consider purchasing all these Class 1B units before the price for these parcels of shoreland becomes too high. This suggestion follows from the views concerning campsite facilities of the camp-

site and summer resort users. They felt that facilities in government owned campsites were the most satisfactory. Private campsites did not seem to be able to provide the same quality of facilities as the government recreational areas. This certainly does not have to be the rule, but until more stringent legislation is brought forward regulating the quality of facilities in private recreational areas, the high potential areas should be owned by the government so that facilities of a high quality can also be provided for all recreationists.

Marie Lake lies immediately to the west of Cold Lake. This lake has excellent water quality and two Class 1+B units. One of the Class 1+B units is located on the northeastern shore and is accessible by an all weather road. Situated on crown land the site was ideally suited for a public campsite. Instead, the site was sub-divided by the Provincial authorities and allowed to become a cottaging site. With the heavy demand for public recreational facilities by recreationists from the Air Base and surrounding area, the development of cottaging at the Class 1+B site on Marie Lake is not wise recreational land use management because the site might have sustained a greater intensity of use as a public campsite rather than as a private cottage development.

Though the writer feels that the CLI system is still one of the best recreational capability classification systems, during the course of the field work some shortcomings were noticeable. Though the criteria for the subclasses (e. g., "Lodging"--N) were most certainly initiated on the best available information, continuing revision of these sub-classes should be made in light of user surveys. For example, it would be

to the benefit of the CLI system if the criteria for "Lodging" (N) were made much more rigid such as the criteria for "Beach" (B). In the cottage user study some of the CLI criteria for lodging were substantiated, others were not. To illustrate, the CLI system maintains that view and ease of access to water are very important. This was substantiated by the cottage user study where the cottagers ranked the view factor of prime importance in selecting a cottage site. Ease of access to water from shore was ranked fifth. However, the CLI system assumes that cottagers prefer steeper gradients offshore as these are more suited for the beaching of boats and the construction of short stable docks. This did not come out in the cottage user study where this factor was ranked in fourteenth place. Cottagers also like sandy beaches and a good vegatative cover, twenty or more feet. Though the CLI system maintains that there should be a capability for vegetative cover, it would seem that a site with good vegetative cover has a higher immediate capability than a barren site with the capability for vegetative growth.

Although the CLI system implies the consideration of weeds offshore in the rating of a lodging site, weeds offshore were ranked by cottagers as the first most serious problem with the site. The fact that there were no weeds offshore was ranked by cottagers as sixth among reasons for selecting a particular cottage site. Thus, though the CLI criteria for lodging are basically sound, further research incorporating findings from this study and further studies of cottager use from other regions could make the "Lodging" (N) subclass more

rigid, quantitative, and meaningful. The same could be done with some of the other subclasses in the CLI system.

Many of the recreational land use problems and inadequacies of the region could be alleviated if a regional planning and development approach was used not only for the recreational resources but also for the total resources. The necessity of this type of approach will be illustrated by discussing the area containing: Pinehurst, Seibert, Touchwood, Jackson, Shaw, McGuffin, Kinnaird, Dabbs, Blackett, Brown, Helena, Ironwood, and Frenchman Lakes.

All the natural recreational resource requirements for a multi-purpose development can be found in this series of lakes. All the lakes in the group are twenty square miles or less in size. It will be recalled that 70.4 per cent of the cottagers showed a preference for lakes of this size. Three lakes--Pinehurst, Touchwood, and Seibert--are in the six to twenty square mile category. Preference for this category was shown by 47.4 per cent of the cottagers. Shoreland recreational capability is high. For example, in beaches Pinehurst has one Class 1+B, and three Class 1-Bs. Touchwood Lake has one Class 1-B. In terms of Class 2 sites: (1) Touchwood Lake has three Class 2-Bs, (2) Pinehurst has two Class 2-Bs, (3) Ironwood Lake has three Class 2-Bs, and two Class 2Ns, (4) Frenchman Lake has three Class 2-Bs. The sport fish capability is from good to excellent. Touchwood, Pinehurst, and Seibert Lakes have been rated good to excellent for sport fishing. Jackson, Kinnaird, Blackett, Helena, Ironwood, and Frenchman have been rated good. Most of the area is in the

Green Area and the vegetation has been protected from fire, thus resulting in some very impressive deciduous and evergreen stands as exist north of Seibert Lake and along the eastern shore of Seibert Lake.

Thus, Pinehurst Lake with its fine beaches, clean water, excellent access road, and large size could become a focal lake for swimming, bathing, fishing, water-skiing, and so on. This lake could be very intensively used. Touchwood and Seibert Lakes are large enough in size that if the demand warranted, they too could be opened up for use by larger boats. On the other hand, Ironwood and Frenchman Lakes would be open only to small boats (e.g., maximum 9.5 horsepower motor). Touchwood, Seibert, Ironwood, and Frenchman Lakes would be used predominantly for angling and recreational activities compatible with angling. On the other hand, the present inaccessible lakes to the west of Touchwood Lake--Jackson, Kinnaird, Dabbs, Blackett, McGuffin, Shaw, Brown, and Helena--could be treated as semi-wilderness lakes, and could be used only for angling and canoeing. Portage trails and only the basic facilities (e.g., dry toilets, fireplaces, garbage cans, picnic tables) could then be provided. In the surrounding upland and amongst all the lakes, could be provided hiking and riding trails.

It would be better if this lakes district were treated as a distinct unit and carefully planned and developed as such. Roads should fit smoothly into a master plan. All the lakes are situated in a non arable soils zone (see Map 6). Agricultural intrusion into this area of lakes should be discouraged.

As previously stated, agricultural intrusion near Elinor Lake is being allowed into the Green Area. This only serves to strengthen the concern that the possibility of recreational land use mismanagement already exists and may accelerate. The fact that Edmonton is part of the recreational hinterland of this area, suggests that immediate and swift action on these lakes be taken by proper Government recreational authorities such as the Alberta Provincial Parks Division. A regional approach to planning and development would simplify the development of an area such as discussed above, by allowing all Authorities and individuals concerned to work together toward a conservation of the resources rather than propagate mismanagement.

Though the techniques of this study could contribute somewhat to such overall regional planning, further recreational research for proper planning and conservation will always be needed. For example, this study does not explore the present and future demand for lake-oriented recreational developments either inside the study area or outside it. This is a very important aspect that would be necessary for wider and wiser recreational planning. A detailed study of the recreationists' expenditures and their influence on the local economy in the area is urgently required. A study examining the total yearly spending should be most helpful. The impact, if any, that these expenditures have on local employment also might be explored. Little in Alberta is known about this latter impact.

The fact that many lakes suffer from algal bloom has been discussed previously. The effect this has on the recreationists' use of the water would be well worth further researching. For example, how severe does the algal bloom have to be before recreationists will discontinue using the water for swimming, bathing, water-skiing, and so on? Perhaps a quantitative measure could be devised in conjunction with the recreationists' opinions. This type of a measure would be of great help in reassessing the capability of a lake.

A study of lake water temperatures for swimming would be very valuable. This could be done either on a regional or province-wide basis. Such a study should measure and interpret water temperatures on the wet beach zone. Such temperatures should be correlated with the users' tolerance levels and an attempt made to arrive at a mean water temperature preferred by users. Such a study would aid immensely in assessing the capability of a lake and provide a standard for the measurement of elements that play a part in the human comfort or discomfort indices.

During the course of the research for this study, it appeared that private summer resorts are having many problems in providing quality facilities, in financing their operations, in their seasonal operation, and in other ways. It is felt that these resorts do provide a necessary service in outdoor recreation and that their problems should be carefully studied and some advice provided to improve the caliber of their facilities. A province-wide study would be preferable, though a regional study is certainly urgent.

Few people from Saskatchewan use the Alberta lakes in the study area. A useful study would be to determine whether it is the provincial border factor, the facilities factor, or what other factors may be causing this. Residents of Lloydminster, which straddles the Alberta-Saskatchewan border, do not appear to make very much use of the lakes either. A study of their recreational habits and the reasons behind them would be very interesting and valuable for planning purposes.

Many other possible studies could be mentioned, but the above are among the more urgent that would enable wise outdoor recreational planning of this north-central Alberta lake region.

GLOSSARY

GLOSSARY

ALGAL BLOOM. A prolific growth of algae.

EUTROPHIC LAKES. "'Rich' lakes; those well provided with the basic nutrients required for plant and animal production."[1]

HOLIDAY. Taken in this study to mean a period of time away from work irrespective of the length of time it encompasses (e.g., one-half day, a weekend, or one month).

OLIGOTROPHIC LAKES. "Those poorly provided with the basic nutrients required for plant and animal production."[2]

VACATION. In this study taken to mean a holiday period longer than a two or three day weekend.

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[1] J. O. Veatch and C. R. Humphrys, Water and Water Use Terminology. Thomas Printing and Publishing Co., Ltd., Kaukauna, Wisconsin, 1966, p. 105.

[2] Ibid., p. 218.

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APPENDICES

APPENDIX A

TERJUNG'S CLASSIFICATION SYMBOLS[1]

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[1] After Werner H. Terjung, "Physiologic Climates of the Conterminous United States: A Bioclimatic Classification Based on Man," Annuals of the Association of American Georgraphers, Vol. 56, No. 1, March, 1966, p. 178.

TABLE LXXXVI

TERJUNG'S COMFORT INDEX

Symbol	Sensation felt by majority
-6	Ultra cold
-5	Extremely cold
-4	Very cold
-3	Cold
-2	Keen
-1	Cool
0	Comfortable
+1	Warm
+2a	Hot
+2b	Oppressive
+3	Extremely hot

TABLE LXXXVII

TERJUNG'S WIND EFFECT INDEX

Symbol	Kcal/m^2hr	Sensation felt by majority
-h	-1400 and beyond	Exposed flesh freezes
-g	-1200 to -1400	Bitterly cold wind chill
-f	-1000 to -1200	Very cold wind chill
-e	- 800 to -1000	Cold wind chill
-d	- 600 to - 800	Very cool wind chill
-c	- 300 to - 600	Cool wind chill
-b	- 200 to - 300	Pleasant wind effects
-a	- 50 to - 200	Warm wind effects
n	+ 80 to - 50	Neutral wind effect
a	+ 160 to + 80*	Warming sensation to skin
b	+ 160 to + 80**	Discomforting heat addition
c	+ 160 and above***	Very discomforting heat addition

*With dry-bulb 86°F to 91°F.

**With dry-bulb 91°F and above.

***With dry-bulb 96°F and above.

TABLE LXXXVIII

TERJUNG'S COMFORT INDEX POSSIBLE DAY-NIGHT COMBINATIONS

Symbols	Group	Symbols	Group
+3/+2b	EH_1	0/0	M_1
+3/+2a	EH_2	0/-1	M_2
+3/+1	EH_3	0/-2	M_3
+3/0	EH_4	0/-3	M_4
+3/-1	EH_5	etc.	etc.
etc.	etc.	-1/-1	C_1
+2b/+2b	S_1	-1/-2	C_2
+2b/+2a	S_2	-1/-3	C_3
+2b/+1	S_3	etc.	etc.
+2b/0	S_4	-2/-2	K_1
+2b/-1	S_5	-2/-3	K_2
etc.	etc.	-2/-4	K_3
+2a/+2a	H_1	etc.	etc.
+2a/+1	H_2	-3/-3	CD_1
+2a/0	H_3	-3/-4	CD_2
+2a/-1	H_4	-3/-5	CD_3
+2a/-2	H_5	etc.	etc.
etc.	etc.	-4/-4	VC_1
+1/+1	W	-4/-5	VC_2
+1/0	W_1	etc.	etc.
+1/-1	W_2	-5/-5	EC_1
+1/-2	W_3	etc.	etc.
etc.	etc.	-6/-6	UC_1
	W_4		

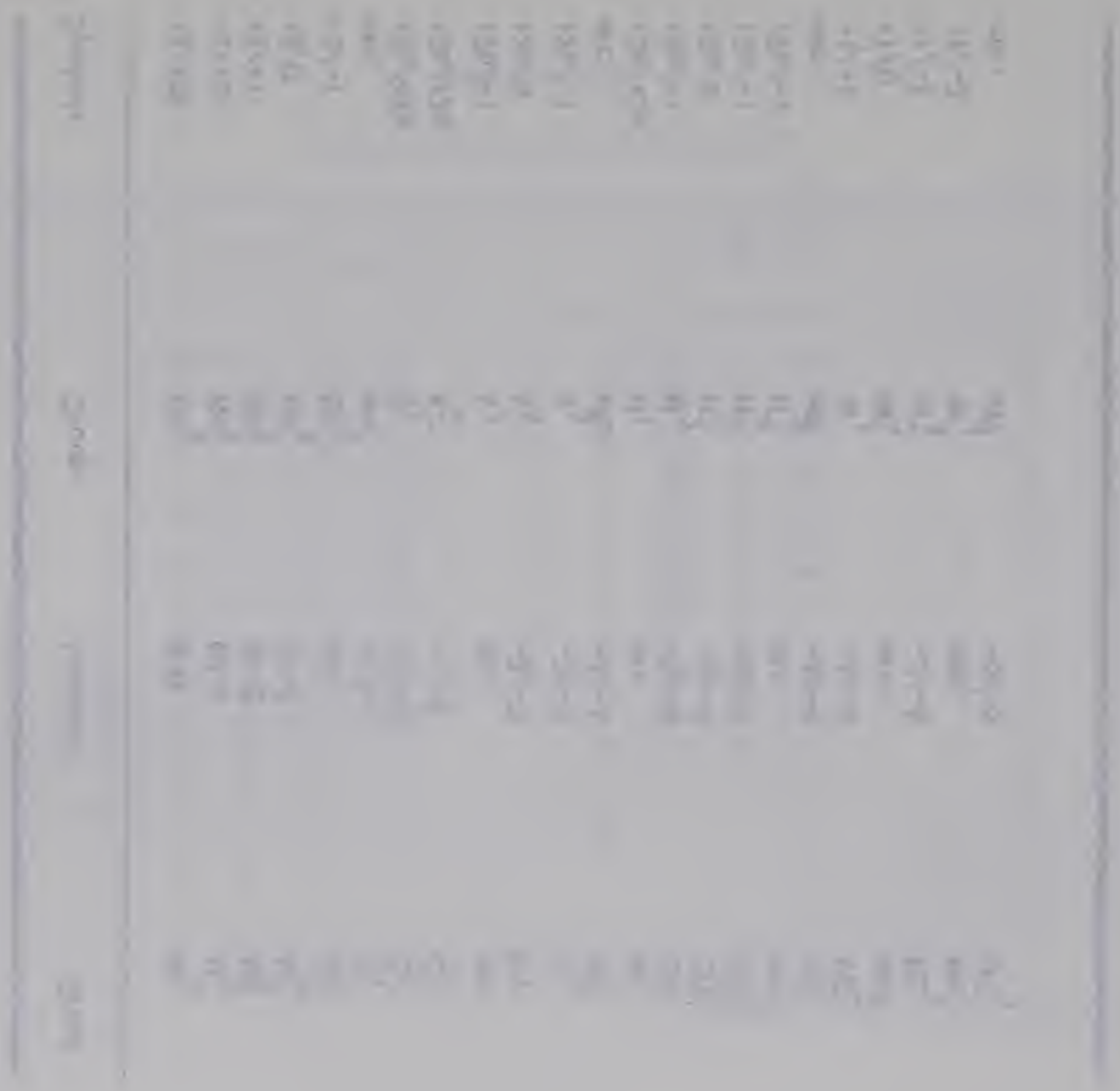
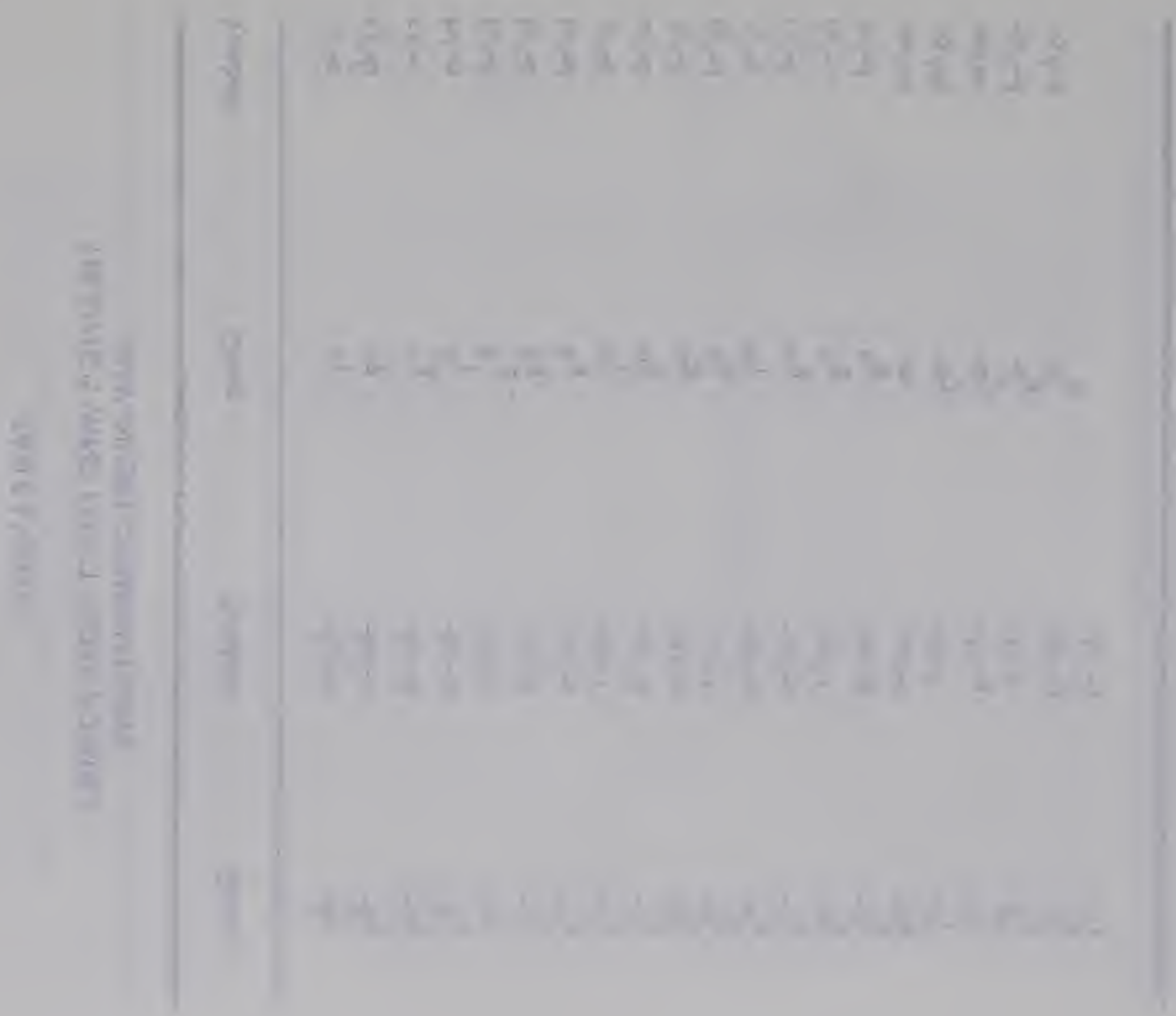


TABLE LXXXIX

TERJUNG'S WIND EFFECT INDEX POSSIBLE
DAY-NIGHT COMBINATIONS

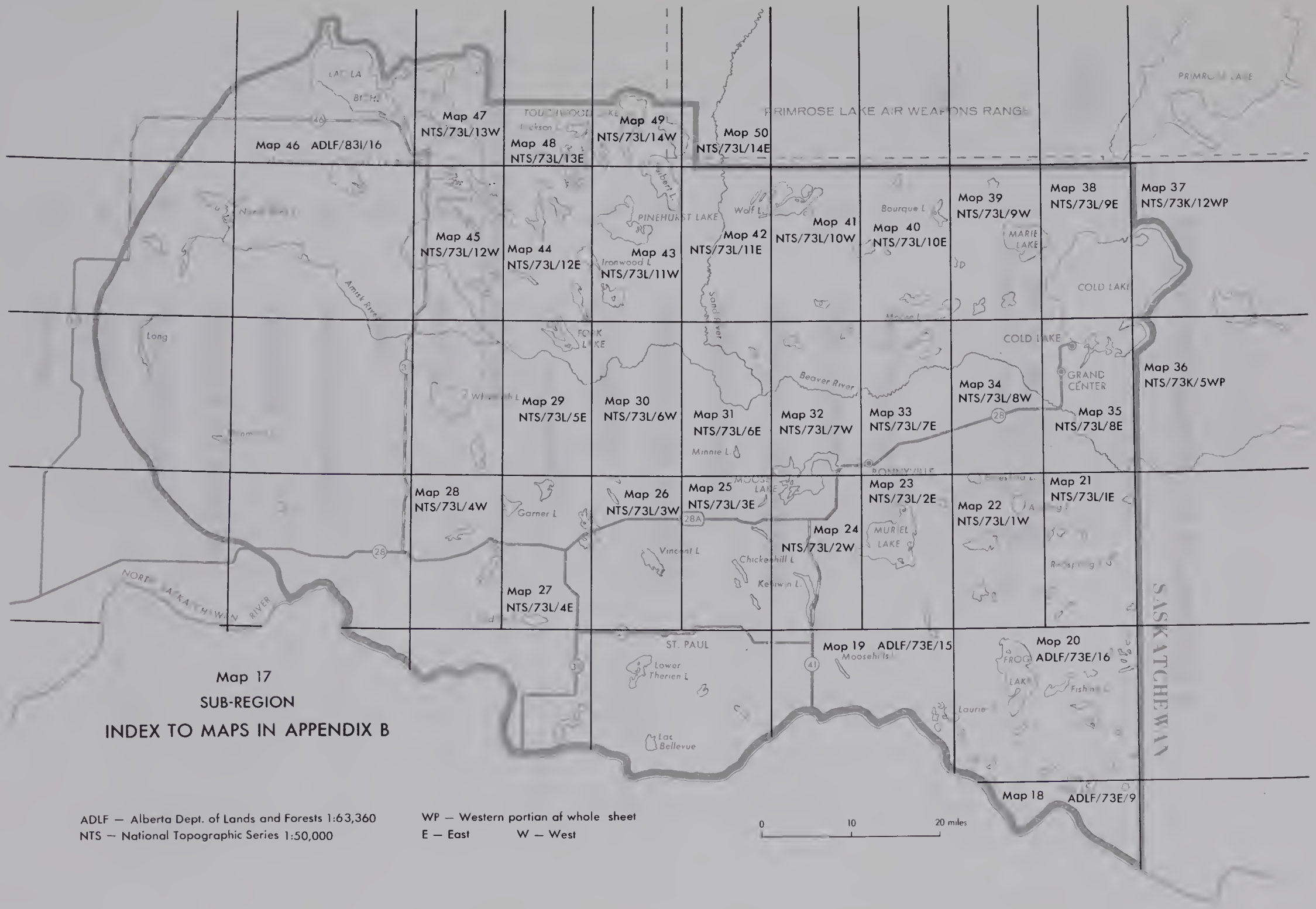
Symbols	Group	Symbols	Group
c/-a	c_1	-b/-b	$-b_1$
c/-b	c_2	-b/-c	$-b_2$
c/-c	c_3	-b/-d	$-b_3$
b/-a	b_1	-b/-e	$-b_4$
b/-b	b_2	-c/-c	$-c_1$
b/-c	b_3	-c/-d	$-c_2$
b/-d	b_4	-c/-e	$-c_3$
a/-a	a_1	-c/-f	$-c_4$
a/-b	a_2	-d/-d	$-d_1$
a/-c	a_3	-d/-e	$-d_2$
a/-d	a_4	-d/-f	$-d_3$
n/-a	n_1	-d/-g	$-d_4$
n/-b	n_2	-e/-e	$-e_1$
n/-c	n_3	-e/-f	$-e_2$
n/-d	n_4	-e/-g	$-e_3$
-a/-a	$-a_1$	-e/-h	$-e_4$
-a/-b	$-a_2$	-f/-f	$-f_1$
-a/-c	$-a_3$	-f/-g	$-f_2$
-a/-d	$-a_4$	-f/-h	$-f_3$
-a/-e	$-a_5$	-g/-g	$-g_1$
		-h/-h	$-h_1$



APPENDIX B

MODIFIED CLI RECREATIONAL CAPABILITY

CLASSIFICATION MAPS



Map 17

SUB-REGION

INDEX TO MAPS IN APPENDIX B

ADLF — Alberta Dept. of Lands and Forests 1:63,360
NTS — National Topographic Series 1:50,000

WP — Western portian af whole sheet
E — East W — West



LEGEND FOR MAPS 18 - 50 IN APPENDIX B

Scale

1:181,600 for Maps 18 - 20, 46
1:182,000 for Maps 21 - 45, 47 - 50

Class

1	Very high capability
2	High capability
3	Moderately high capability
4	Moderate capability
5	Moderately low capability
6	Low capability
7	Very low capability

Recreation Features or Subclasses

A	Angling
B	Beach
D	Deep Inshore Water
E	Vegetation
J	Gathering and Collecting
K	Organized Camping
N	Lodging
V	Viewing

W	Wetland Wildlife
Y	Family Boating
Z	Man-made Features

Limitations

a	Beach activities limited by steep slopes offshore
b	Limited usable beach backed by steep or cliffed slopes
c	Till or clay beach, little or no sand
d	Water depth inadequate for some aquatic activities
e	Erosion hazards a limitation, e.g., steep slopes, susceptibility to slumping, light soils unable to hold cover under use
f	Water area inadequate for: (1) aquatic activities such as sailing, motor boating and water skiing, (2) Class 1B
g	No beach due to excessively steep or cliffed shoreline
h	Use of beach and offshore zones limited by stones
j	Fluctuating water level
k	Normal water temperatures too cold for swimming
l	Beach suited to bathing limited in length
m	Use of shoreland limited by mud flats, marsh, or muskeg
n	Poor water quality due to natural aquatic nuisances (e.g., underwater or surface weed beds) or pollution (mineral or organic)

o	Lacks level or gently sloping area suitable for constructing support facilities necessary for intensive use types of development
q	Sandy wet beach but with no dry beach due to dense vegetation or a small rise in the backshore at the water line
r	A stony or rocky surface offering a hindrance to use or development
s	Sand of inferior quality, i.e., contains a high degree of silt or organic matter
t	Steep slopes hindering access or use
v	Very shallow wet beach, e.g., 2 per cent slope
w	Impaired drainage - a hindrance to use or development
x	Sparse or poor tree cover
y	Serious insect problem
z	Beach activities limited by man-made development on the backshore, e.g., a major road

1+B, 1-B, 2+B, 2-B

1+B	Class 1B with no limitations
1-B	Class 1B with 1 limitation point[1]
2+B	(a) 1,000 feet of beach with 2 limitation points, OR (b) 300 feet of Class 2B with no limitations
2-B	(a) 1,000 feet of beach with 3 limitation points, OR (b) 300 feet of Class 2B with 1 to 3 limitation points

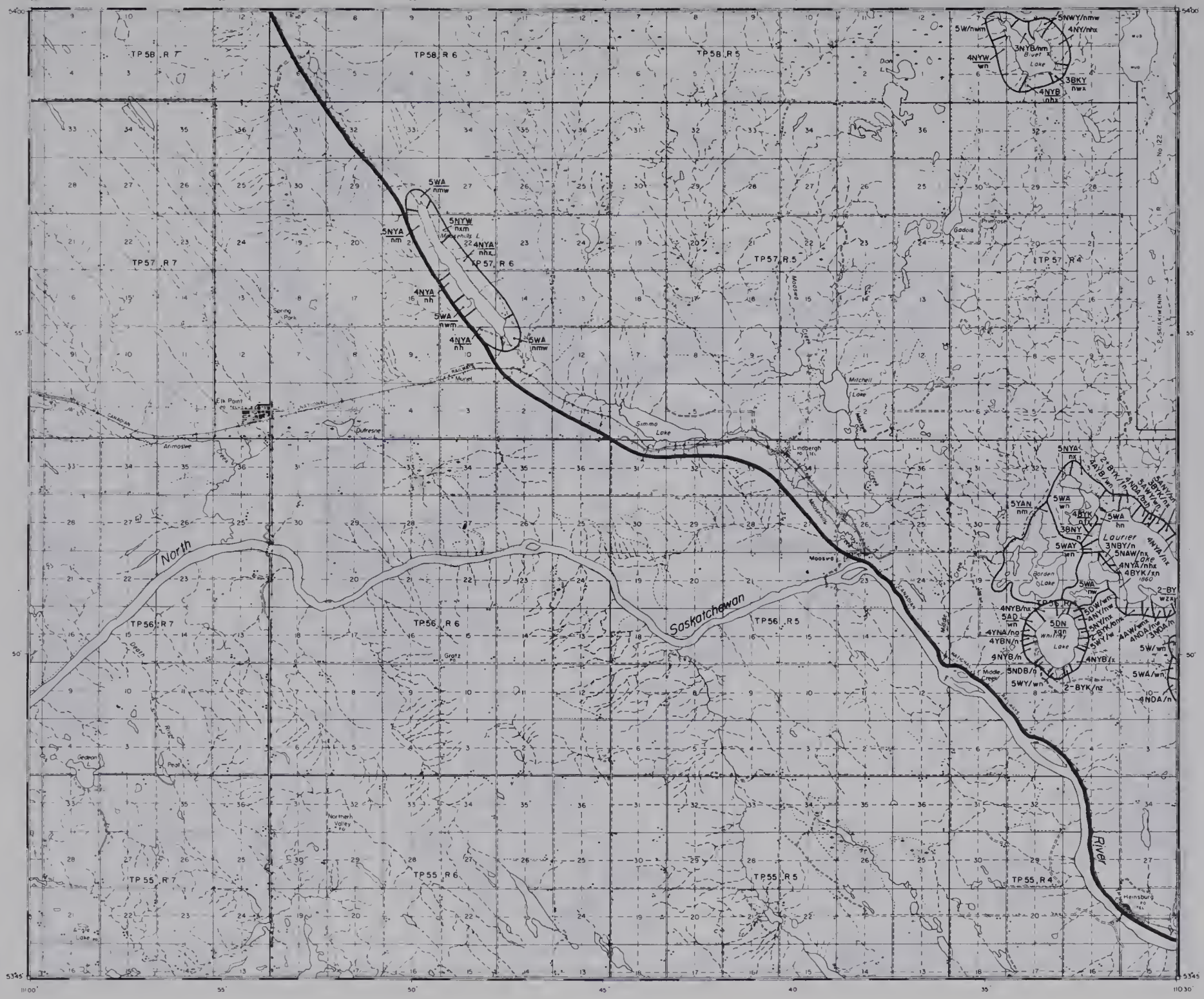
Cartographic work for Maps 18 - 50 carried out by Inge Huemmert

[1] Refer to Table 1.


110°30'
25'
20'
15'
10'
05'
110°00'
53°45'
53°30'
40'
35'
5WYN/nx
TP 55, R 3
TP 55, R 2
5WO nmw
5WO fmw
4NY fwdmx
Hills Lake
5WO nmw
4NYB nx
5NY nwx
5NY nmw
Lake
5WY nmw
John
TP 55, R 1
Garson Lake
North
Saskatchewan
River
MAKAOO
I. R. No 120
TP 54, R 4
TP 54, R 3
TP 54, R 2
TP 54, R 1
Leo Park
River
TP 53, R 4
Hazeldine
Canadian
TP 53, R 3
TP 53, R 2
TP 53, R 1
Leighton
Vermilion
FOURTEENTH BASE LINE
Pasquia
TP 52, R 4
TP 52, R 3
TP 52, R 2
TP 52, R 1
Marwayne
Alcurve
Lakes

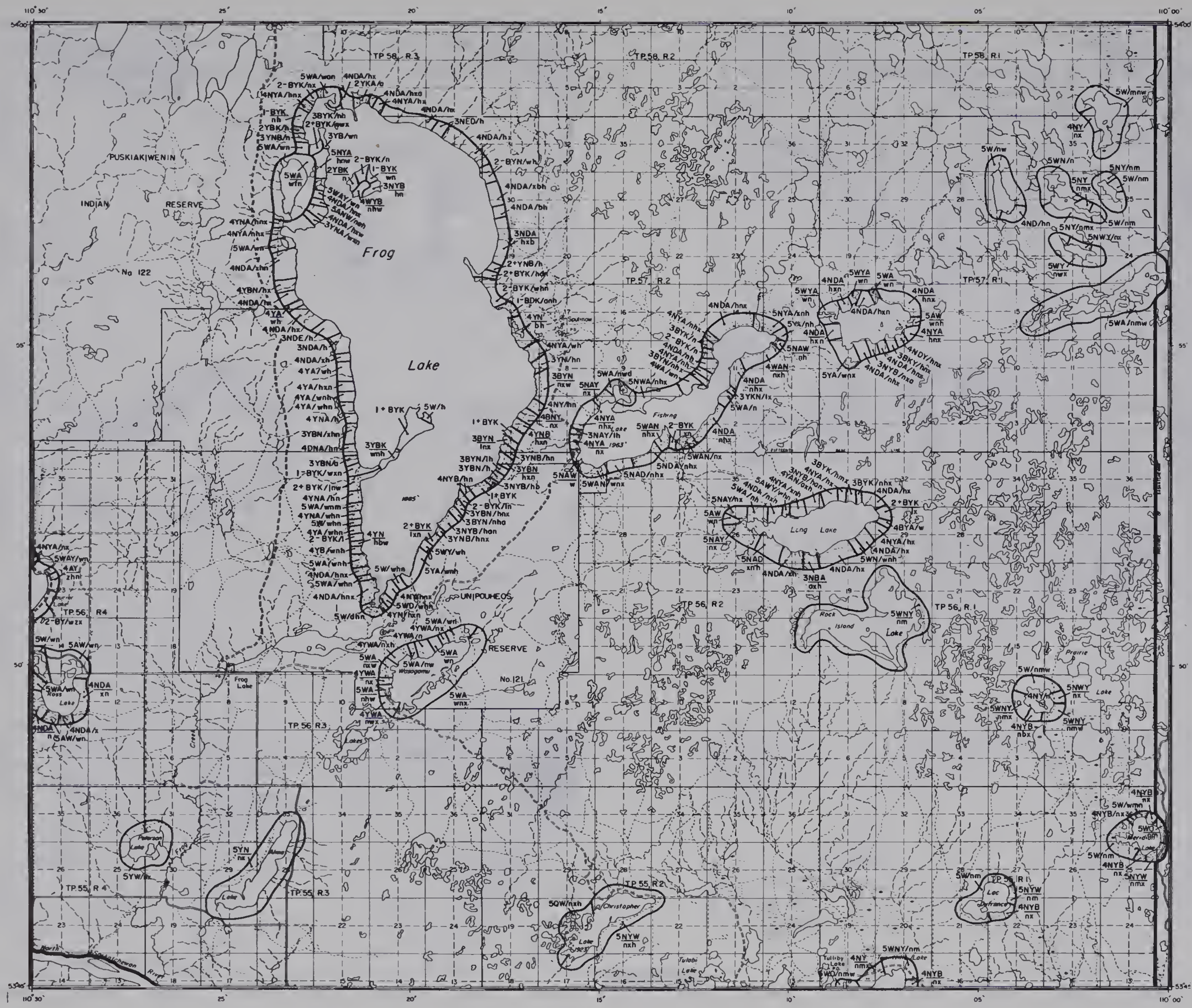
Map 18




TP58, R7
TP58, R6
TP58, R5
TP57, R7
TP57, R6
TP57, R5
TP57, R4
TP56, R7
TP56, R6
TP56, R5
TP55, R7
TP55, R6
TP55, R5
TP55, R4
5WA nmw
5NYW nxm
5NYA nm
4NYA nhz
4NYA nh
5WA nwm
5WA nmw
5NWY/nmw
4NY/nhx
5W/nwm
3NYB/nm
4NYW wn
4NYB nhx
3BKY nwx
5NYA nx
5YAN nm
5WA wn
4BYK nx
5WA hn
3BNY n
5WAY wn
5WA nw
4NYB/nx
5AD wn
4NYA/no
4YBN/n
9NYB/n
3NDB/n
5WY/wn
2-BYK/nz
5W/wn
5WA/wn
4NDA/n
Laurier Lake
Gadois L.
Primrose
Mitchell Lake
Simmo Lake
Moosomin Creek
Moosomin L.
Dore L.
Spring Park
Dutrescu
Arimoswe
Grotz P.O.
Northern Valley P.O.
Heinsburg P.O.
Lindbergh P.O.
Eta Point P.O.
North Saskatchewan River
CANADIAN NATIONAL RAILWAYS
Muriel
Meeting Creek
Sandy Ridge
No. 122

Map 19

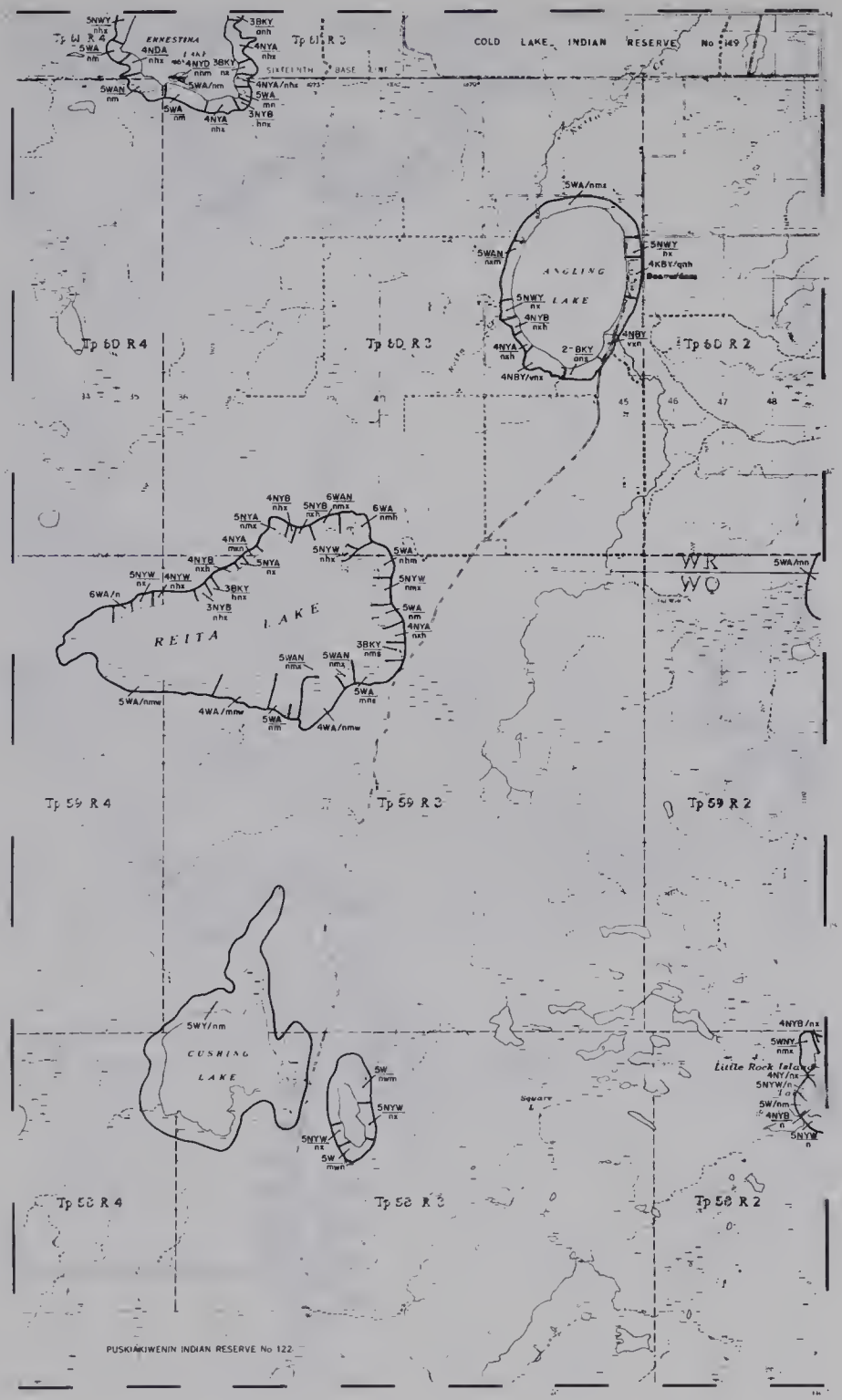




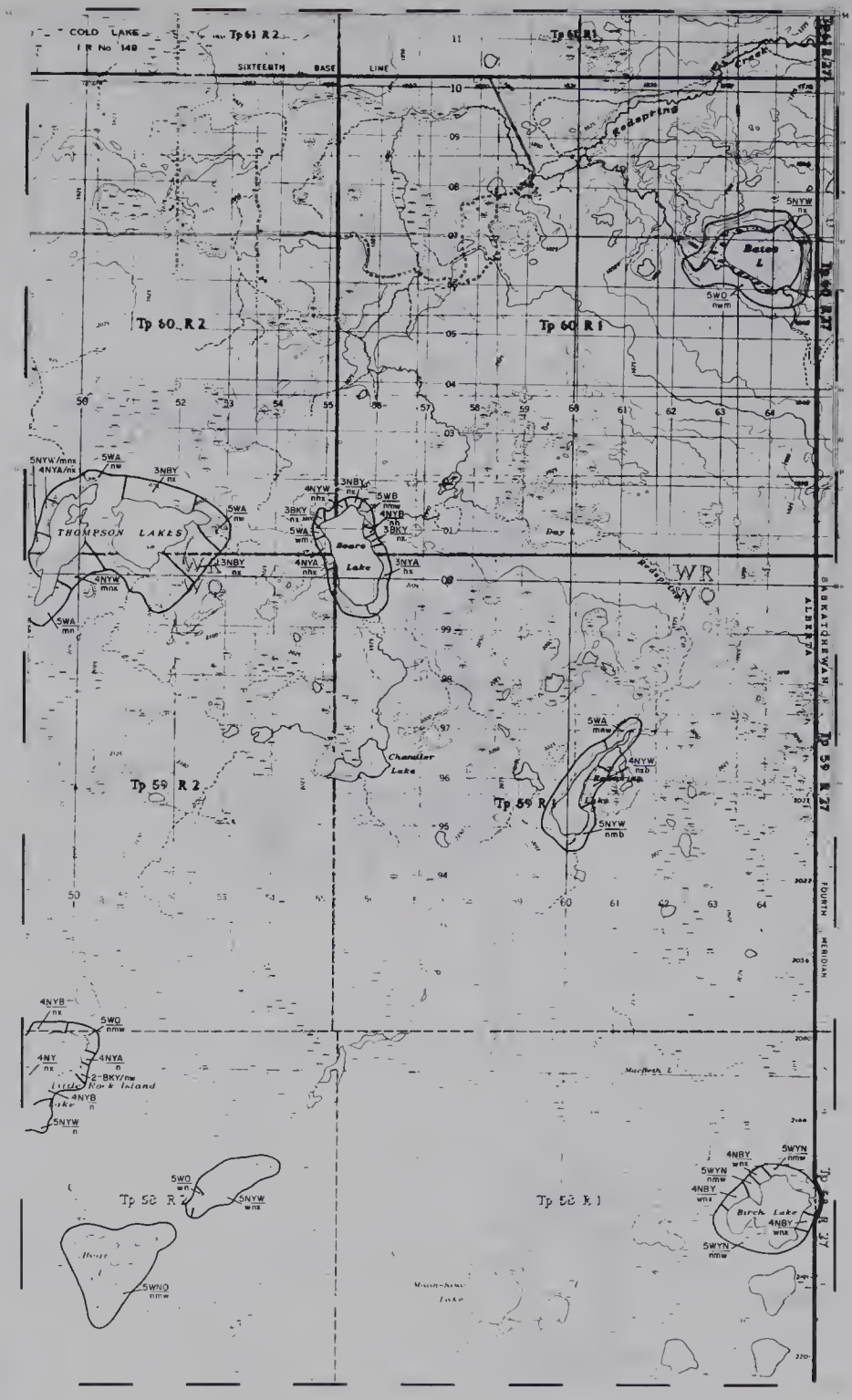
Frog
Lake
Long Lake
Rock Island Lake
PUSKIAKIWENIN
INDIAN
RESERVE
No 122
UNIPOUHEOS
RESERVE
No. 121
TP 58 R 3
TP 58 R 2
TP 58 R 1
TP 57 R 2
TP 57 R 1
TP 56 R 4
TP 56 R 3
TP 56 R 2
TP 56 R 1
TP 55 R 4
TP 55 R 3
TP 55 R 2

Map 20



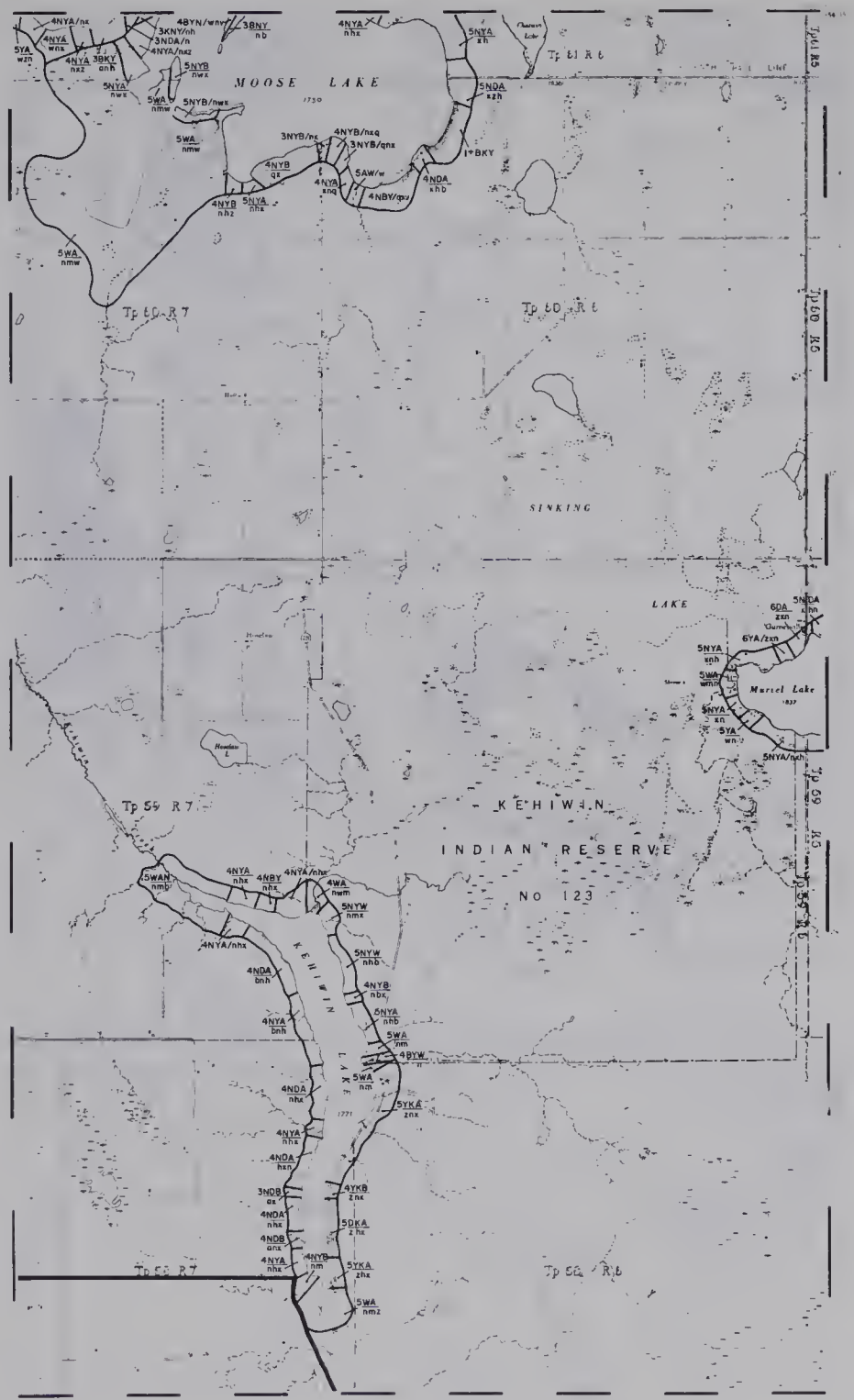

Tp 61 R 4
ENNESTINA
Tp 61 R 3
COLD LAKE INDIAN RESERVE No 149
SIXTEENTH BASE LINE
Tp 60 R 4
Tp 60 R 3
Tp 60 R 2
ANGLING LAKE
REITA LAKE
WR
WO
Tp 59 R 4
Tp 59 R 3
Tp 59 R 2
CUSHING LAKE
Square L
Little Rock Island
Tp 58 R 4
Tp 58 R 3
Tp 58 R 2
PUSKIAKIWENIN INDIAN RESERVE No 122

MAP 22

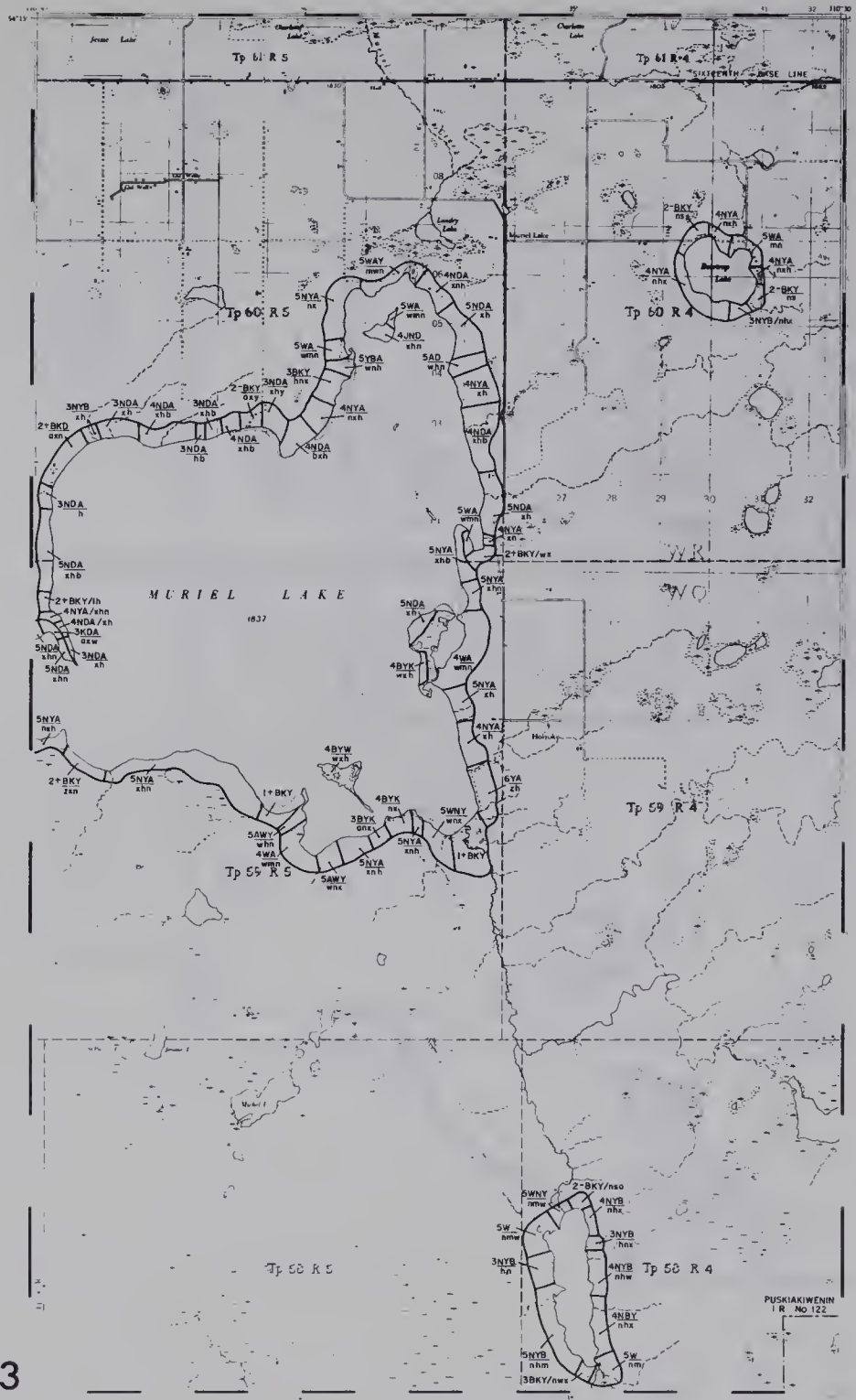

COLD LAKE I R No 149
SIXTEENTH BASE LINE
Tp 61 R 2
Tp 61 R 1
Tp 60 R 2
Tp 60 R 1
Beaver Creek
Beaver L
THOMPSON LAKES
Beaver Lake
Day
WR
WO
Tp 59 R 2
Tp 59 R 1
Chandler Lake
Tp 58 R 2
Tp 58 R 1
Little Rock Island
Birch Lake
SASKATCHEWAN
ALBERTA
FOURTH MERIDIAN

MAP 21

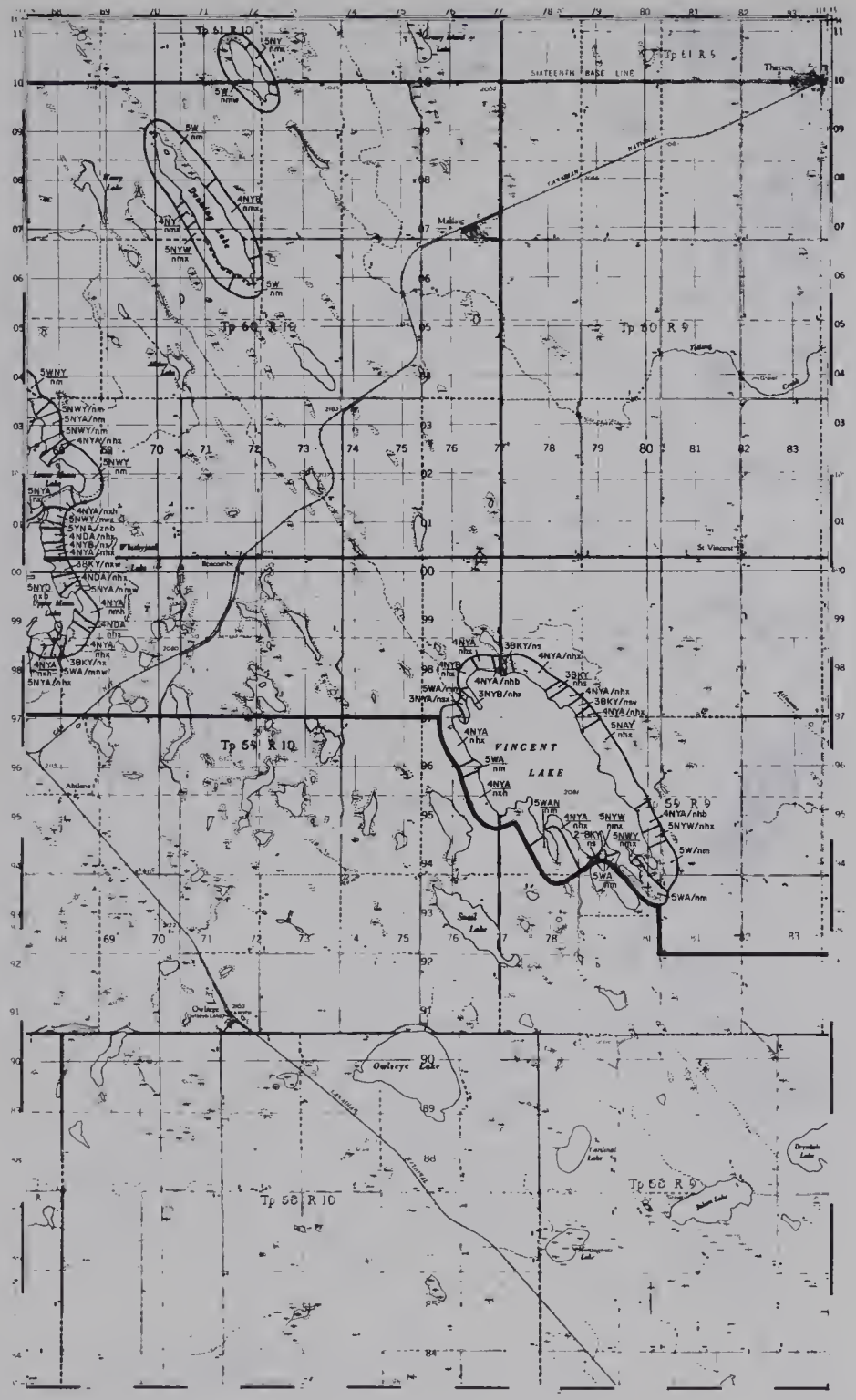



MOOSE LAKE
SINKING
LAKE
KEHIWIN
INDIAN RESERVE
NO 123
Tp 61 R 6
Tp 60 R 7
Tp 60 R 6
Tp 59 R 7
Tp 59 R 6
Tp 58 R 7
Tp 58 R 6
Muriel Lake

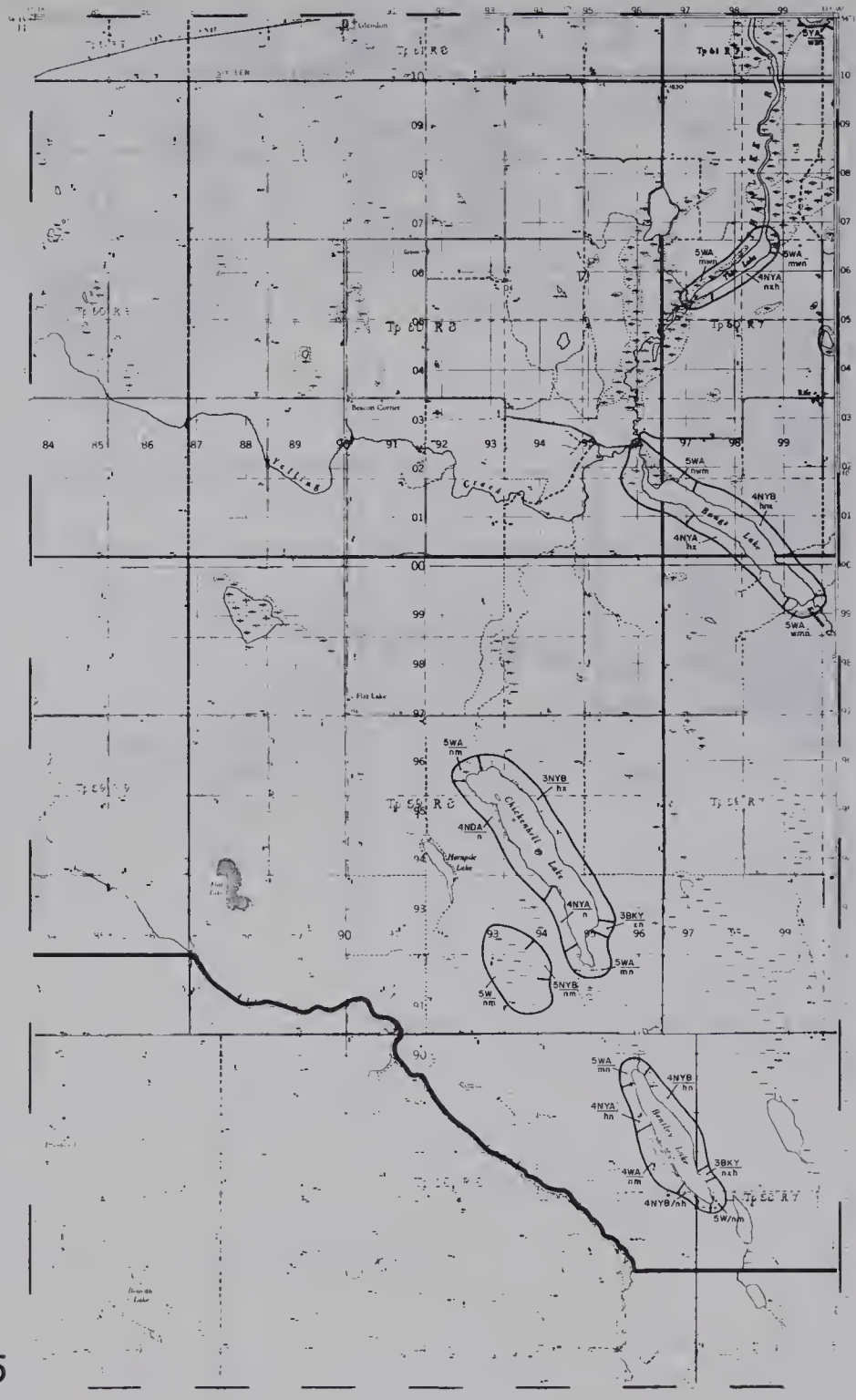
MAP 24


Tp 61 R 5
Tp 61 R 4
SIXTEENTH BASE LINE
Tp 60 R 5
Tp 60 R 4
MURIEL LAKE
Tp 59 R 5
Tp 59 R 4
Tp 58 R 5
Tp 58 R 4
PUSKIAKIWENIN I R No 122

MAP 23

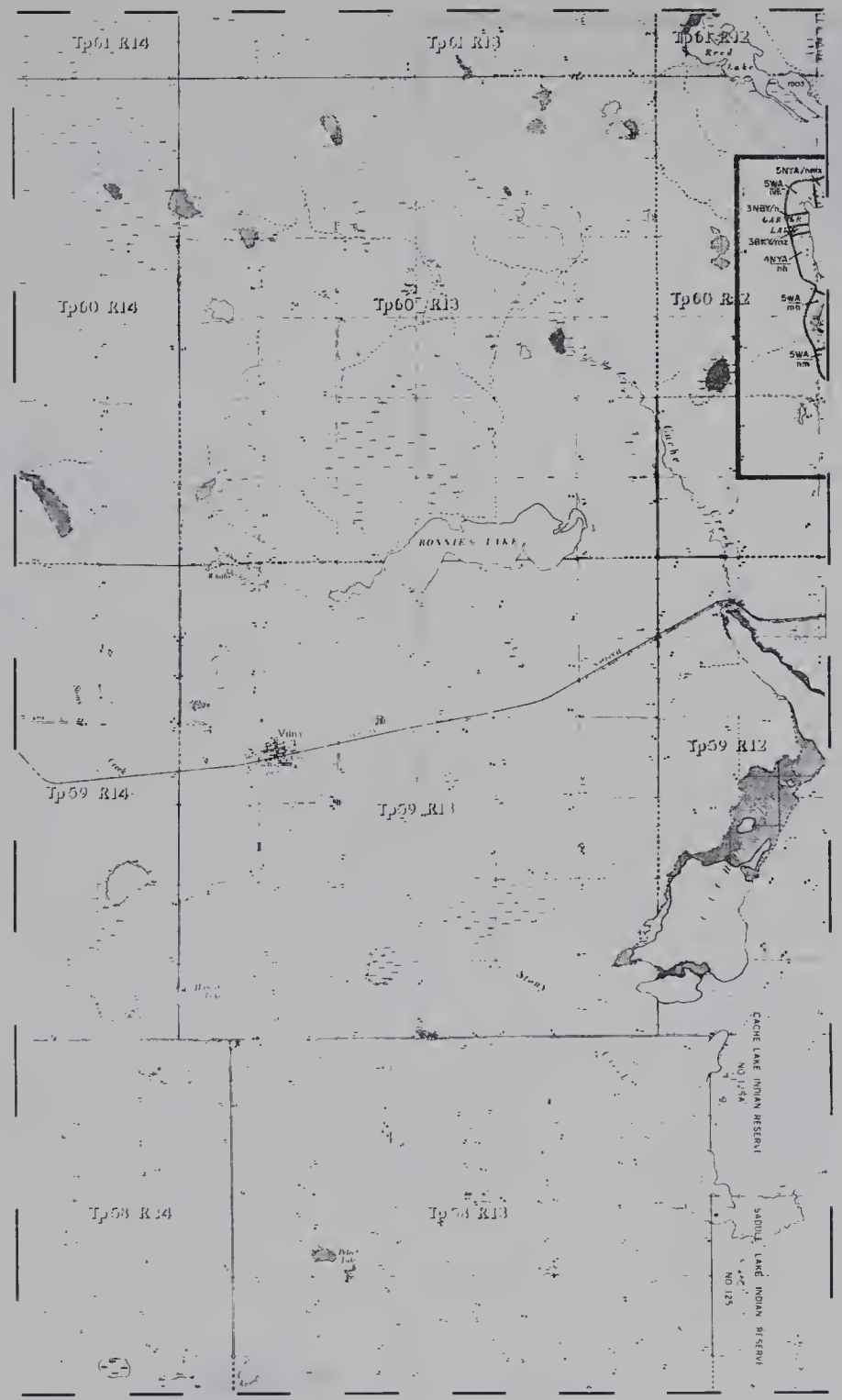

Tp 61 R 10
Tp 61 R 9
SIXTEENTH BASE LINE
Tp 60 R 10
Tp 60 R 9
Tp 59 R 10
Tp 58 R 10
Tp 58 R 9
VINCENT LAKE
Oulseye Lake
Drowning Lake
Beacon Inc
St Vincent
Tp 55 R 9

MAP 26

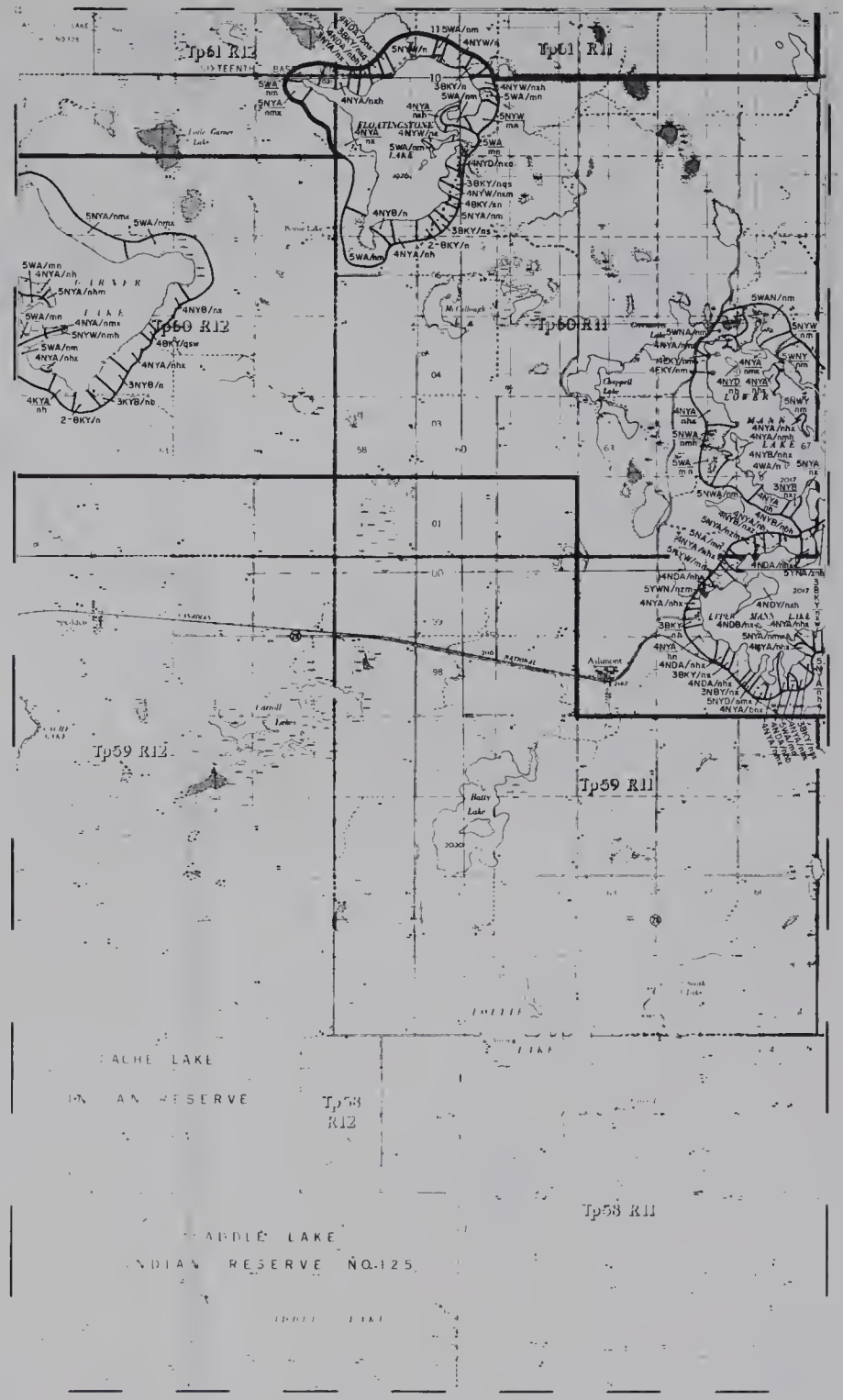

Tp 61 R 8
Tp 60 R 8
Tp 60 R 7
Tp 59 R 8
Tp 58 R 8
Tp 58 R 7
Beacon Corner
Flat Lake
Chickenhill Lake
Bentley Lake

MAP 25



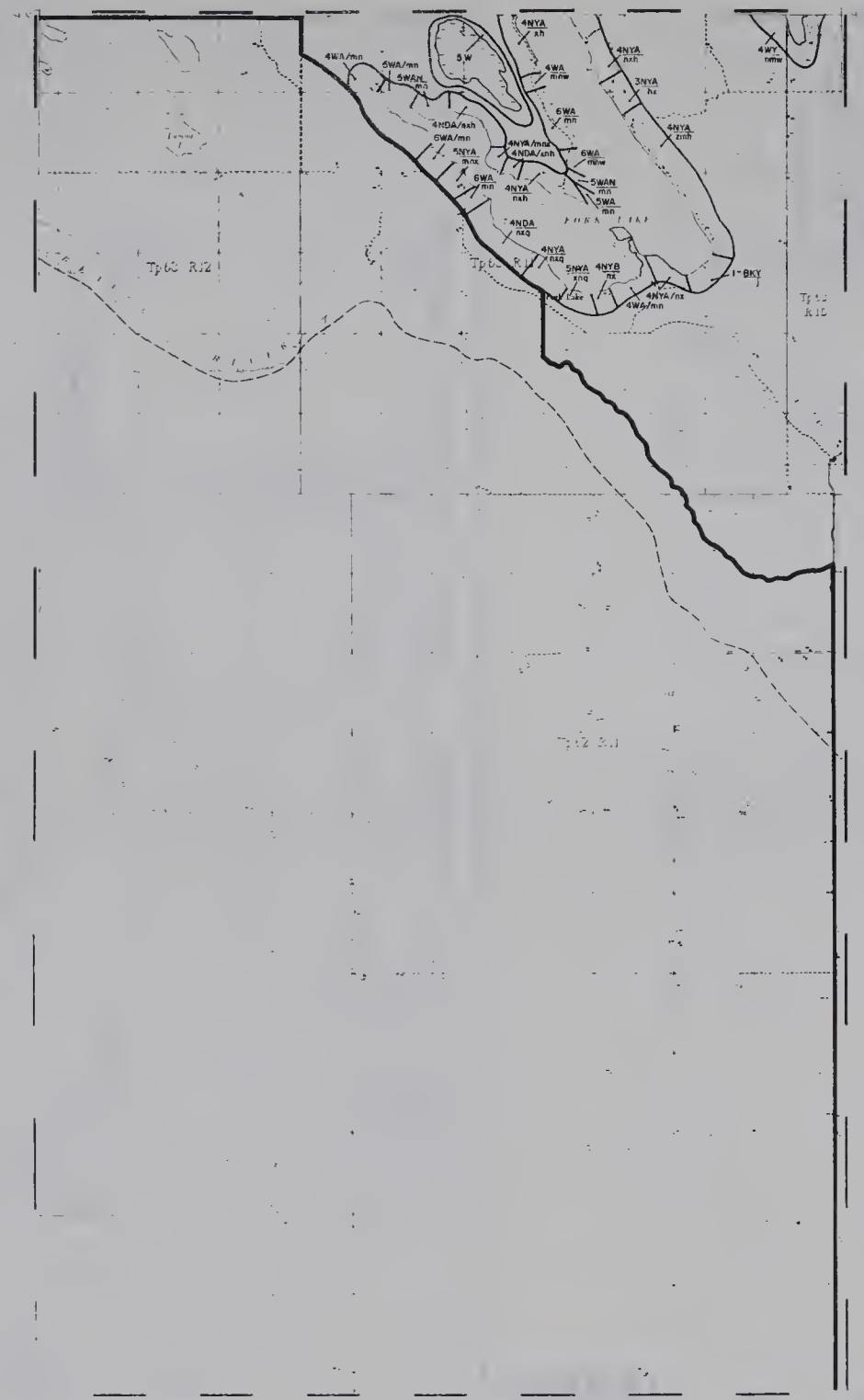

Tp61 R14
Tp61 R13
Tp61 R12
Tp60 R14
Tp60 R13
Tp60 R12
Tp59 R14
Tp59 R13
Tp59 R12
Tp58 R14
Tp58 R13
RONNIE'S LAKE
CACHE LAKE INDIAN RESERVE NO.149A
SADDLE LAKE INDIAN RESERVE NO.125

MAP 28


Tp61 R12
Tp61 R11
Tp60 R12
Tp60 R11
Tp59 R12
Tp59 R11
Tp58 R12
Tp58 R11
CACHE LAKE
INDIAN RESERVE
SADDLE LAKE
INDIAN RESERVE NO.125

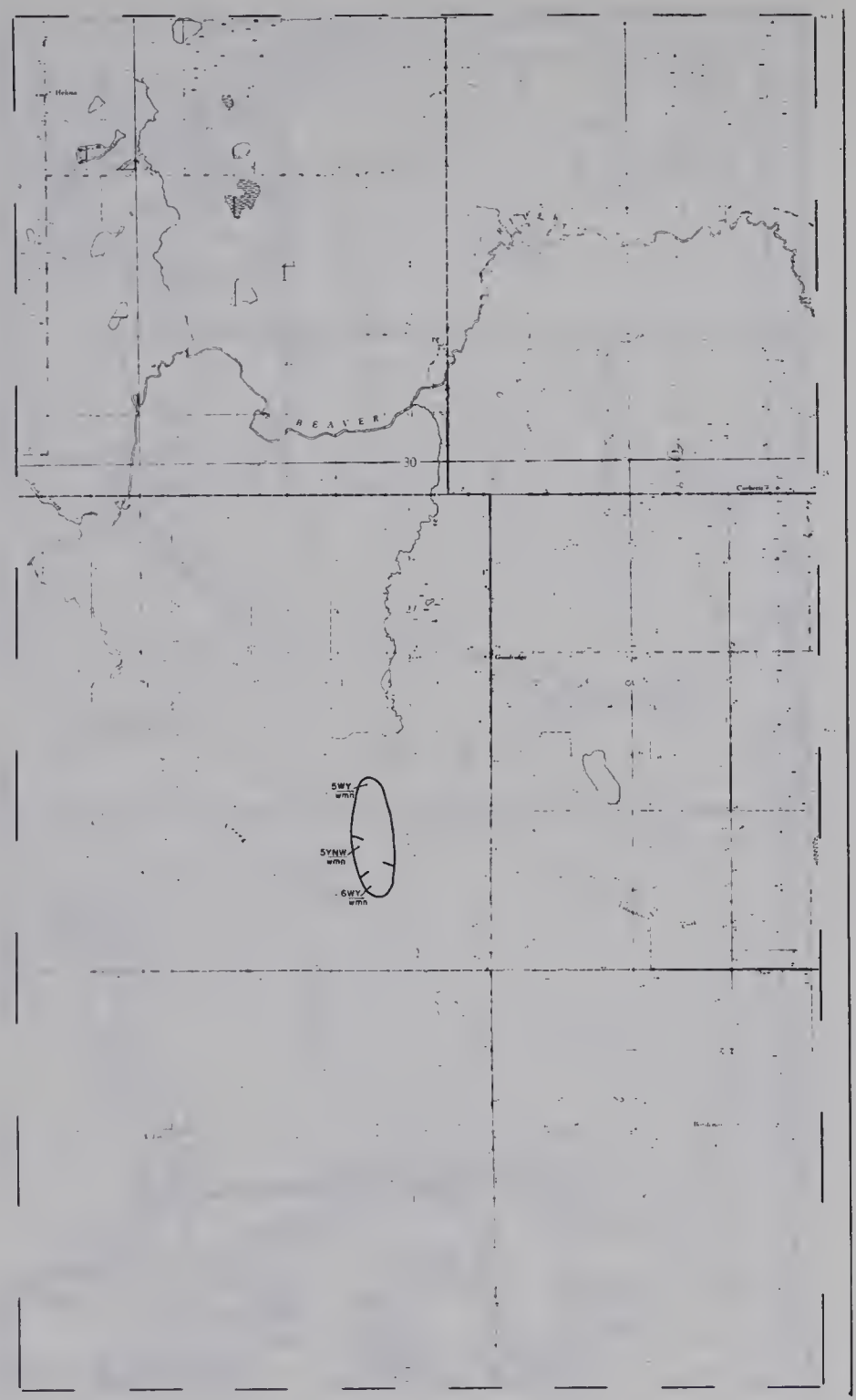
MAP 27



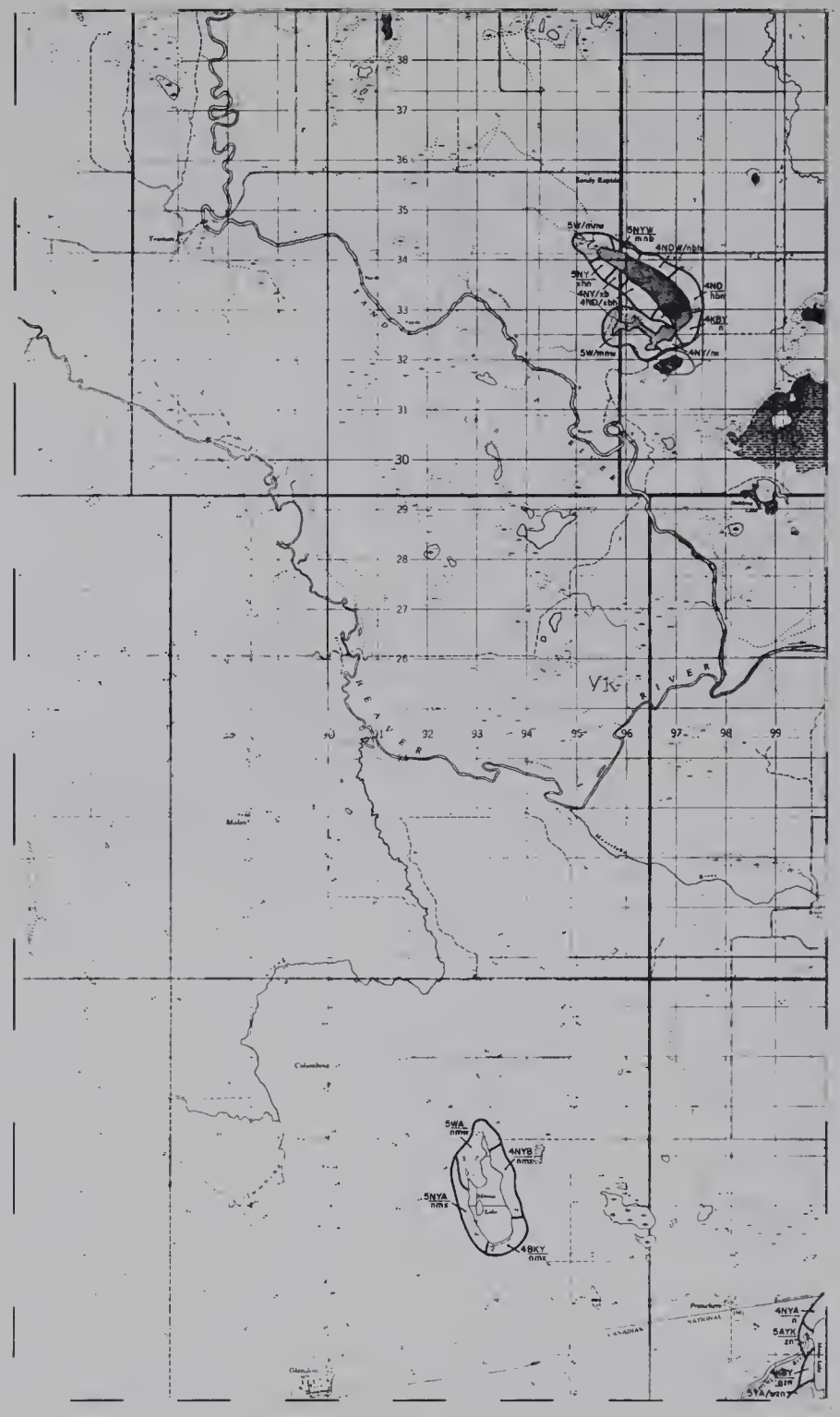

4NYA xh
4NYA nxh
3NYA hx
4WY nmw
4WA/mn
5WA/mn
5WAN mn
5W
4WA mnw
6WA mn
4NDA/xah
6WA/mn
5NYA mnx
4NYA/mnx
4NDA/znh
6WA mnw
6WA mn
4NYA nah
5WAN mn
5WA mn
4NDA naq
4NYA xnq
5NYA xnq
4NYB nx
4NYA/nx
4W6/mn
1-BKY
4NYA znh
Tp63 R12
Tp63 R13
Tp62 R13

MAP 29



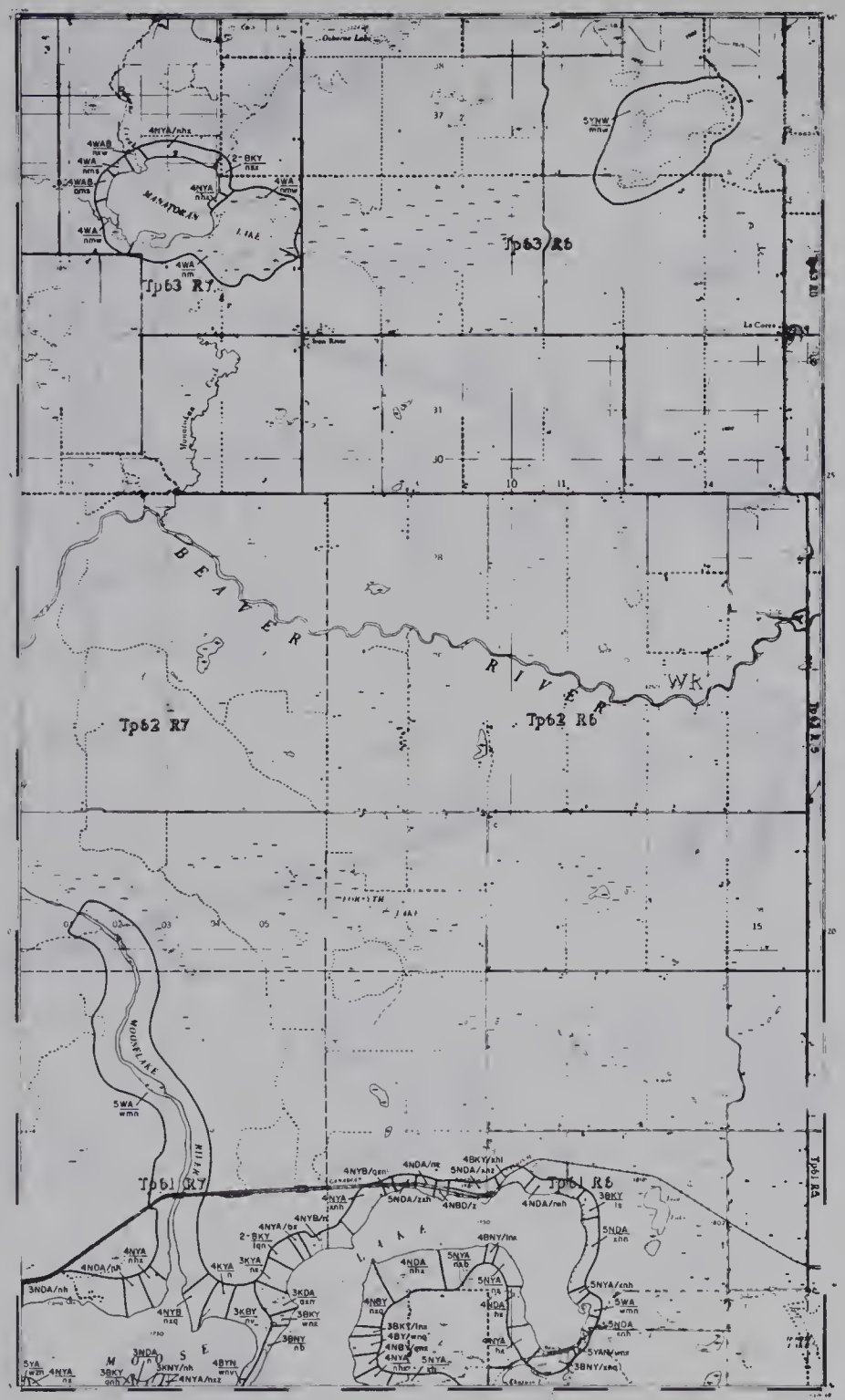

BEAVER
30
5WY wmn
5YNW wmn
6WY wmn

MAP 30

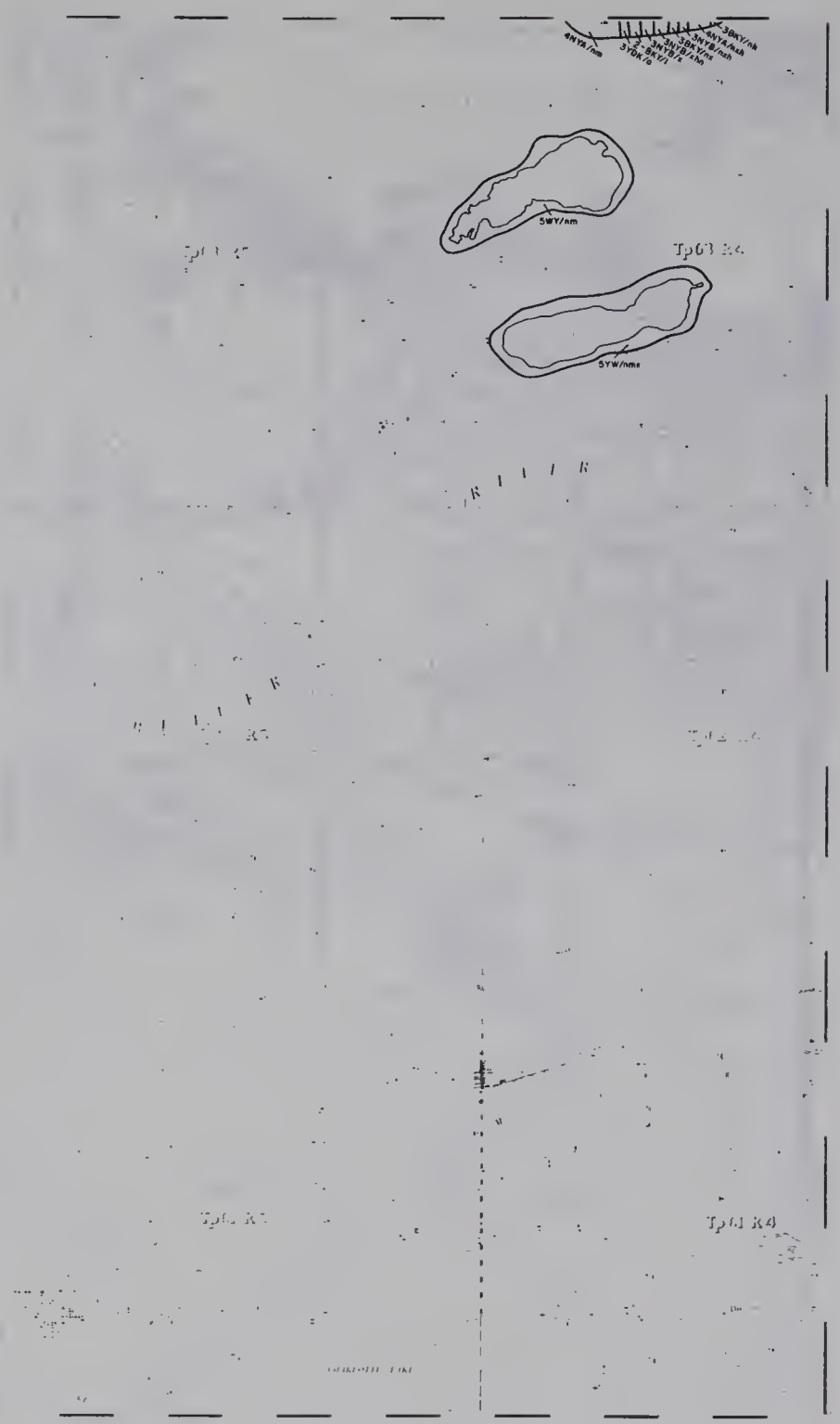

38
37
36
35
34
33
32
31
30
29
28
27
26
5W/mnw
5NYW mnb
4NDW/nbh
5NY/nb
4NY/sb
4ND/ebh
4ND nbh
4KBY n
5W/mnw
4NY/ne
SAND
32 93 94 95 96 97 98 99
RIVER
5WA nmw
4NYB nmx
5NYA nmx
4BKY nmx
4NYA n
5AYK zn
4BY zn

MAP 31



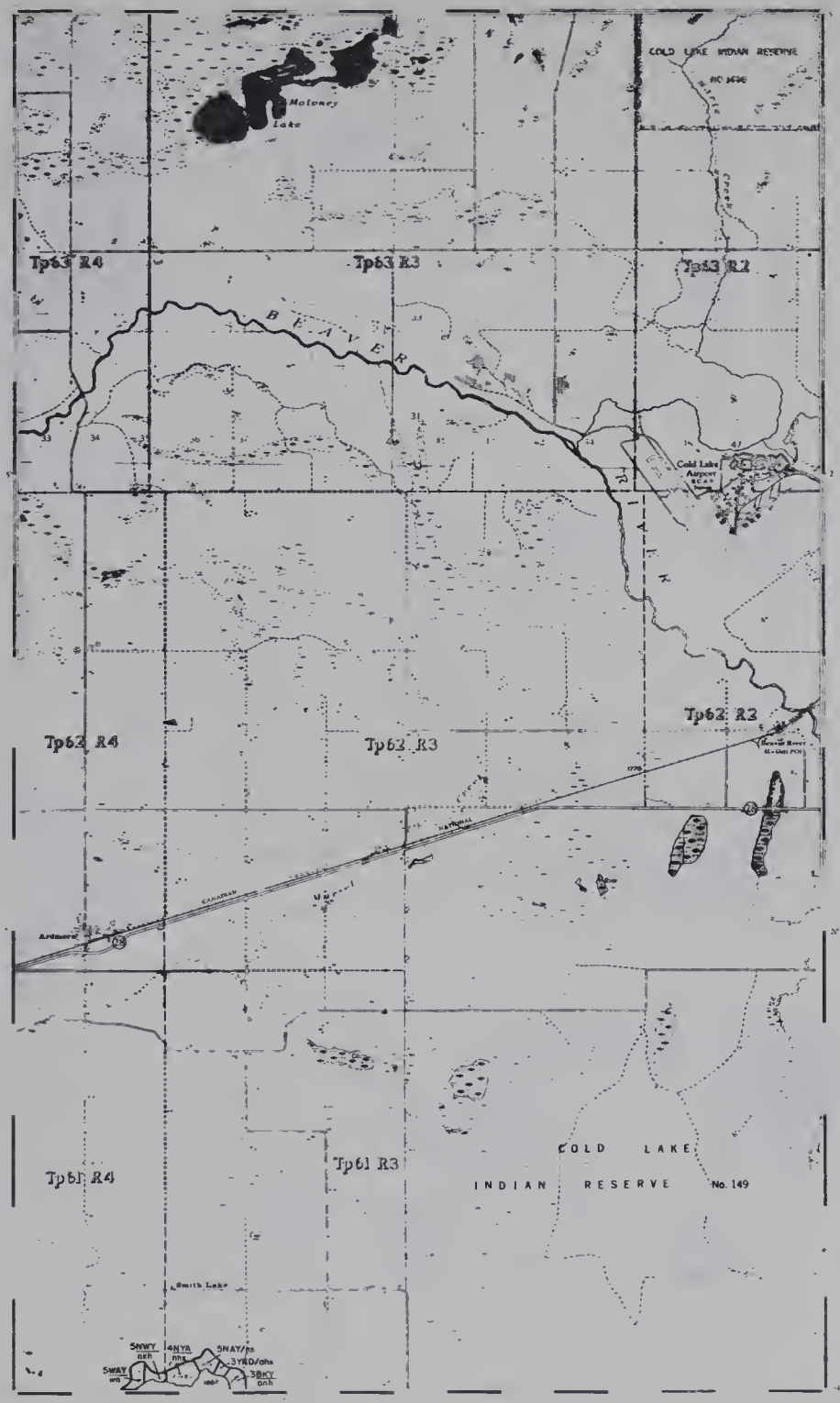

Tp63 R7
Tp63 R6
Tp62 R7
Tp62 R6
Tp61 R7
Tp61 R6
BEAVER RIVER
MANITOKAN LAKE
MOUNT LAKE
MOOSE

MAP 32

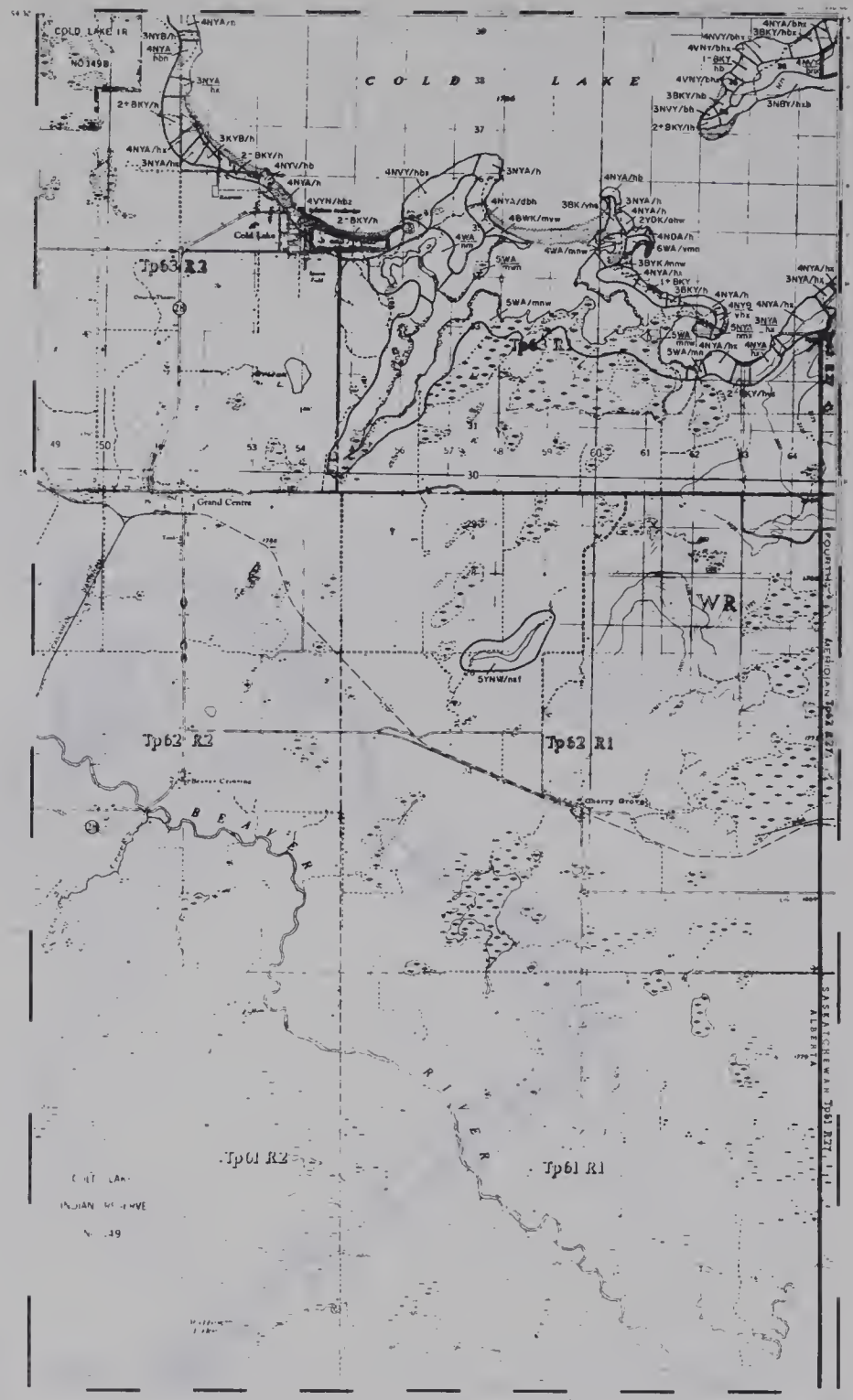

Tp63 R4
Tp61 R4

MAP 33




COLD LAKE INDIAN RESERVE
Moloney Lake
Tp63 R4
Tp63 R3
Tp63 R2
BEAVER
Cold Lake Airport
Tp62 R4
Tp62 R3
Tp62 R2
Tp61 R4
Tp61 R3
COLD LAKE
INDIAN RESERVE No. 149
Smith Lake

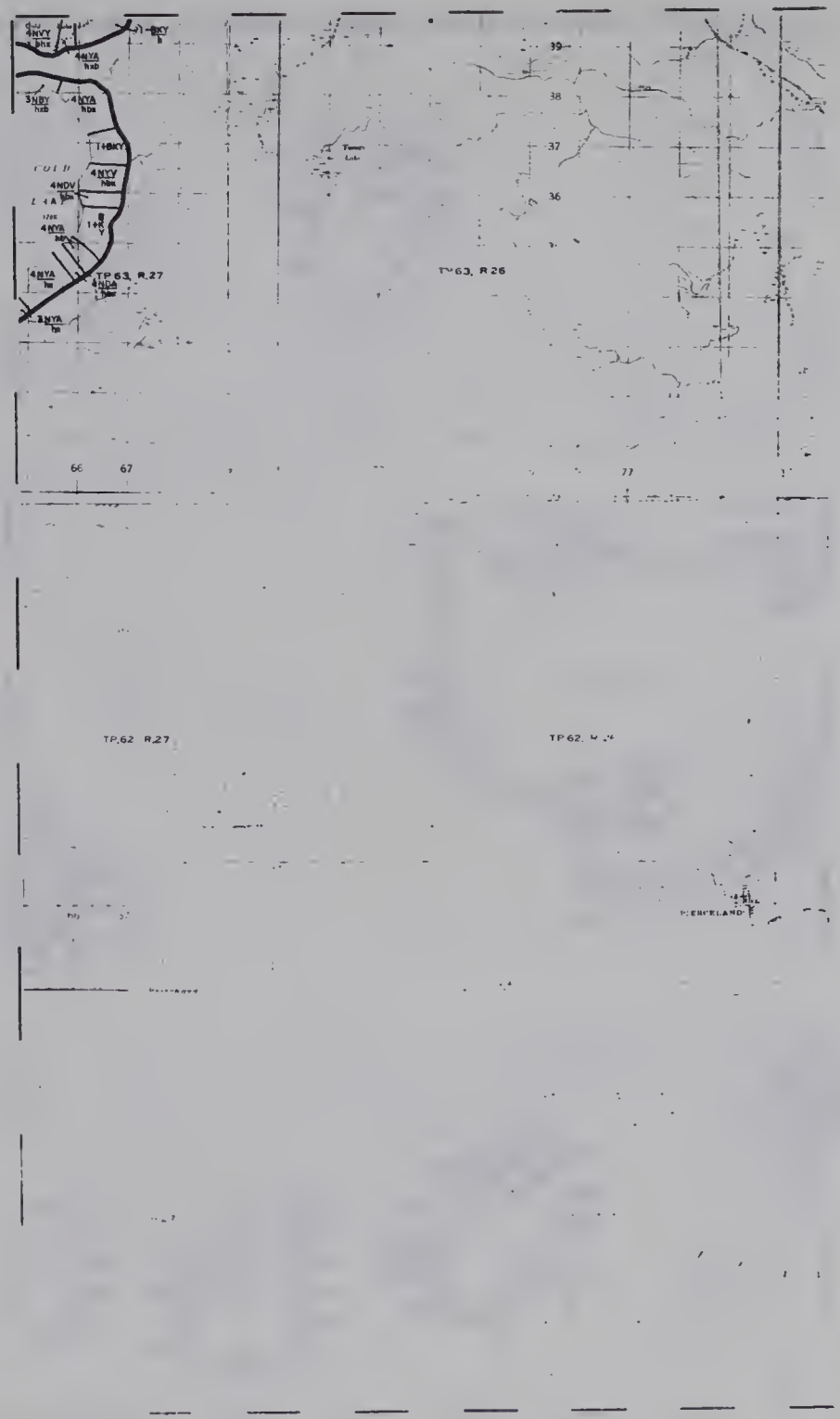
MAP 34


COLD LAKE
Cold Lake
Grand Centre
Tp63 R3
Tp62 R2
Tp62 R1
BEAVER
Tp61 R2
Tp61 R1

MAP 35



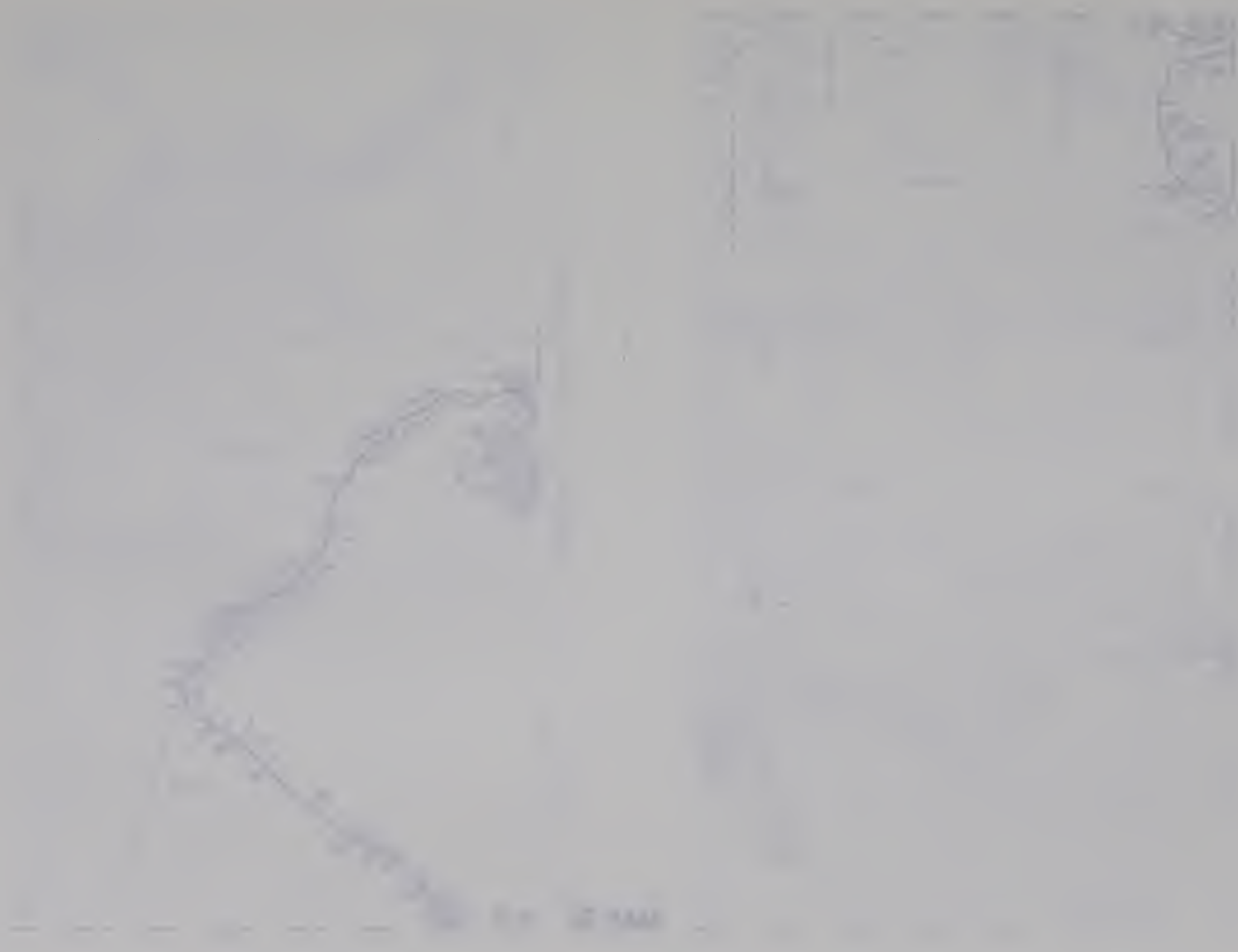


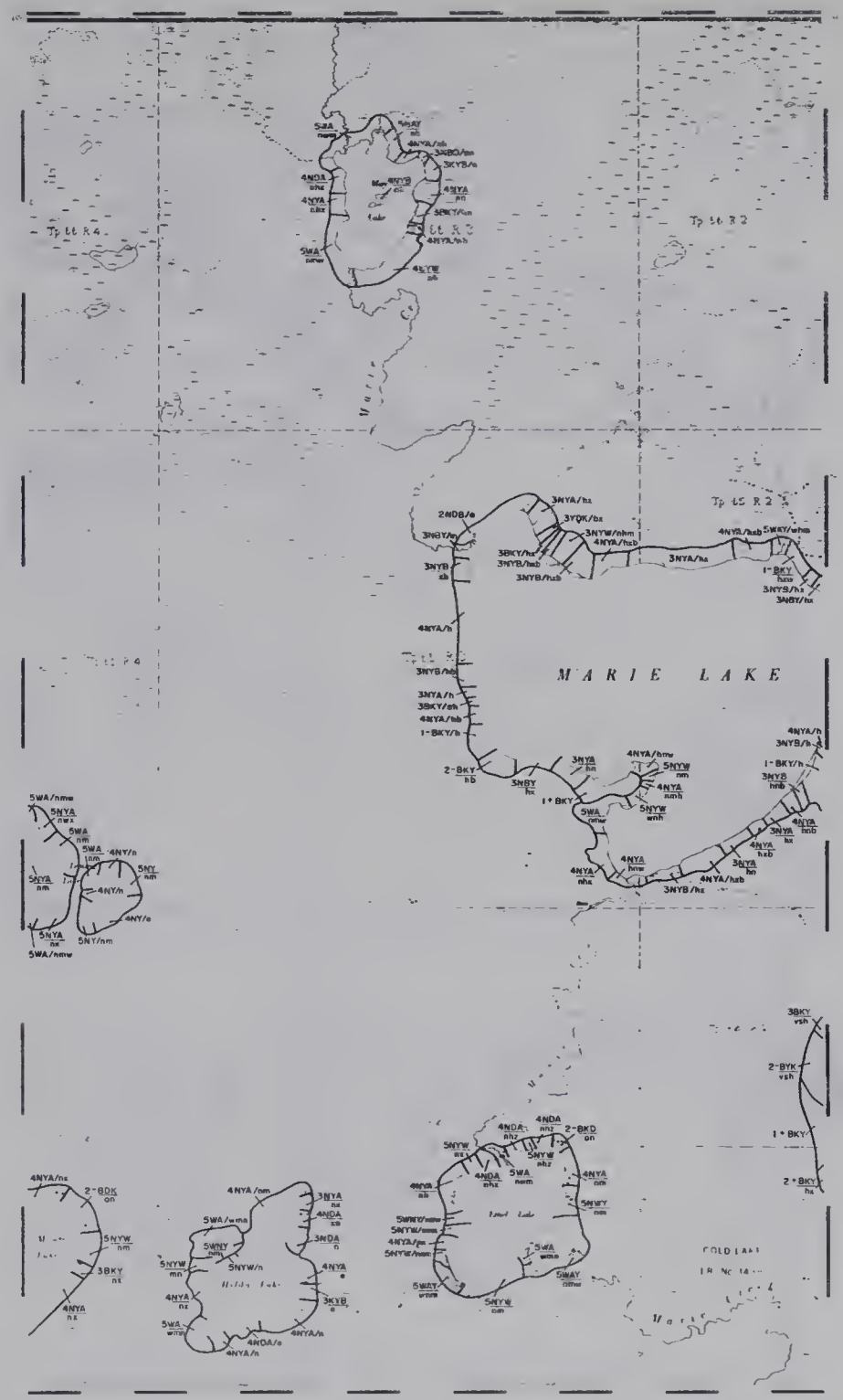

TP 63, R 27
TP 63, R 26
TP 62, R 27
TP 62, R 26
66
67
77
39
38
37
36
PEREELAND

MAP 36


TP 64 R 26
TP 64 R 25

MAP 37



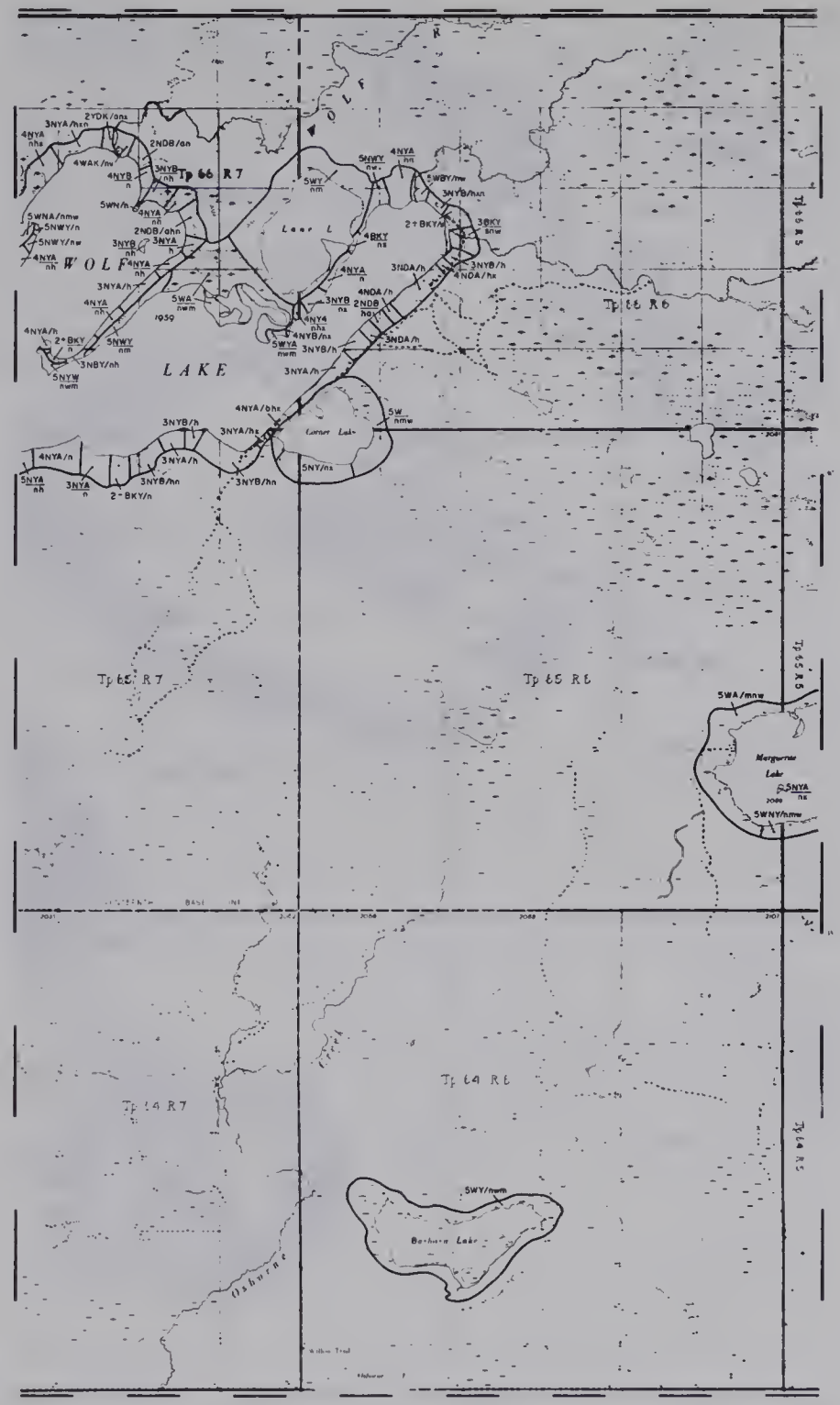

MARIE LAKE
Tp 66 R 4
Tp 66 R 3
Tp 65 R 2
Marie Lake
COLD LAKE
IR No 149

MAP 39


Tp 66 R 2
Tp 66 R 1
Tp 65 R 2
Tp 65 R 1
Tp 64 R 2
MEDLEY RIVER
MARIE HEAD
Marie Lake
SEVENTEENTH BASE LINE
COLD LAKE
English Bay
1756
COLD LAKE
IR No 149B

MAP 38




WOLF
LAKE
Tp 66 R7
Tp 66 R6
Tp 65 R7
Tp 65 R6
Tp 64 R7
Tp 64 R6
Tp 65 R5
Tp 64 R5
Laser L
Lower Lake
Marguerite Lake
Bethune Lake
Osborne
5WA/mnw
5SNYA
5SWNY/nmw
5SWY/nwm

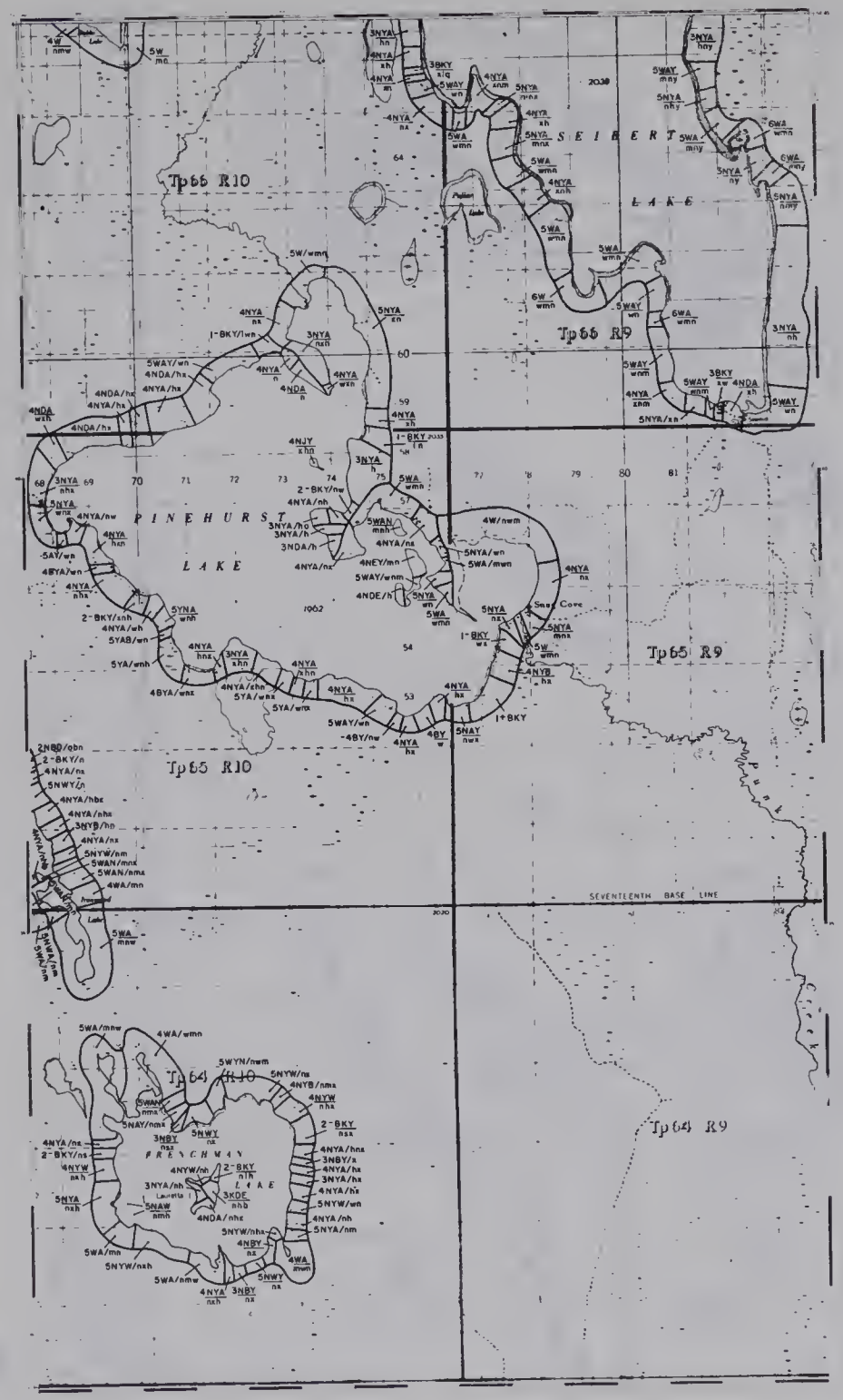
MAP 41


Tp 66 R5
Tp 66 R4
Tp 65 R5
Tp 65 R4
LAKE
5WA/mnw
5NYA
5SWYN
5SWNY
5SWA
5SWAN
5SNAY/nbx
5SWNA
4NYW
3NYB
3NDB
3BKY
2-BKY/n
3TOK/n

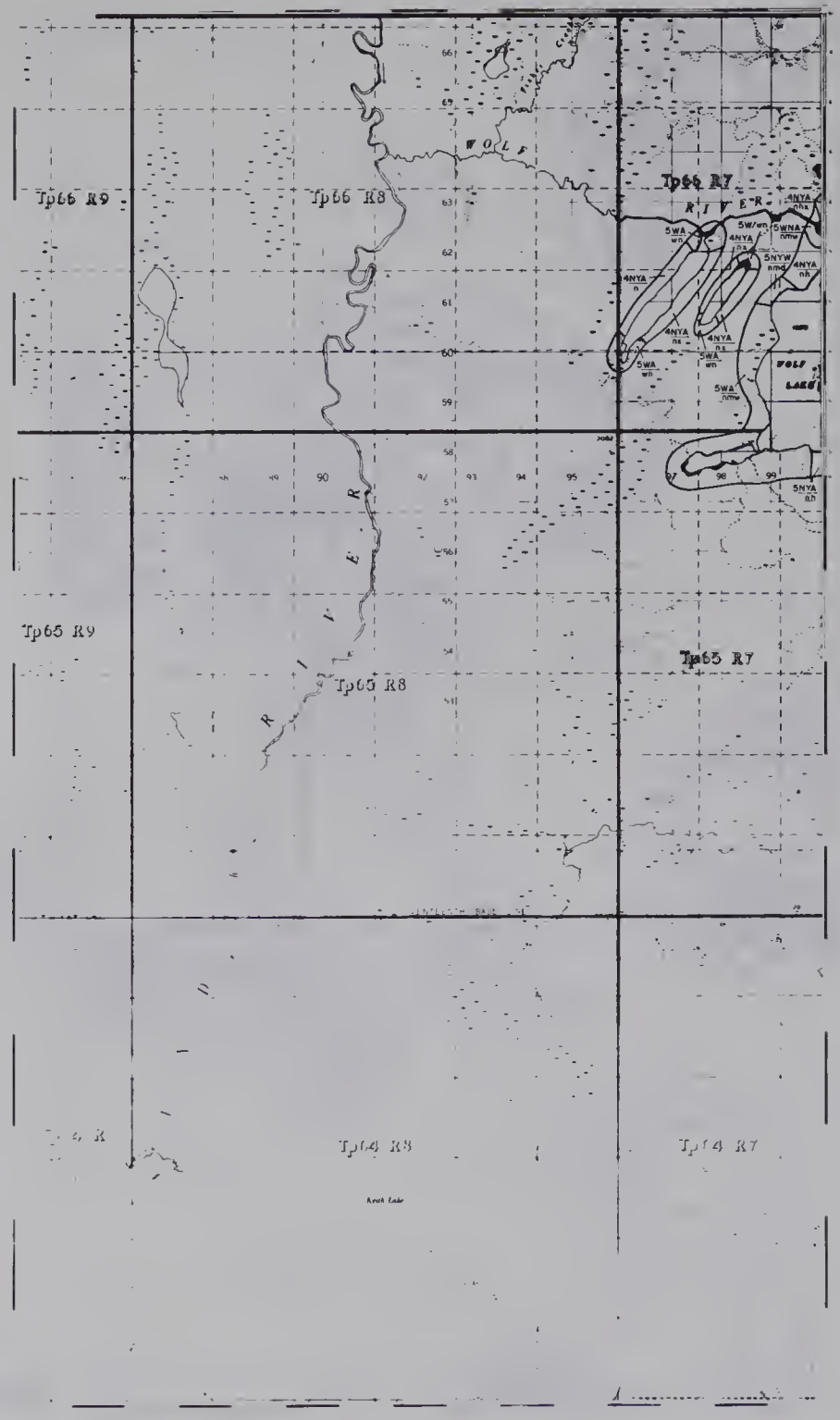
MAP 40






Tp65 R10
Tp65 R9
Tp64 R10
Tp64 R9
SEIBERT LAKE
PINEHURST LAKE
SEVENTEENTH BASE LINE

MAP 43


Tp66 R9
Tp66 R8
Tp66 R7
WOLF RIVER
WOLF LAKE
Tp65 R9
Tp65 R8
Tp65 R7
Tp64 R8
Tp64 R7

MAP 42




BEAVER LAKE
INDIAN RESERVE
No 131
SEVENTEENTH BASE LINE
BUPPIE LAKE
Tp 65 R14
Tp 65 R13
Tp 65 R12
Tp 64 R14
Tp 64 R13
Tp 64 R12

Map 45


Tp 65 R12
Tp 65 R11
Tp 65 R10
HELENA LAKE
ELINOR LAKE
IRONWOOD LAKE
SEVENTEENTH BASE LINE
Tp 64 R12
Tp 64 R11
Rich Lake

Map 44



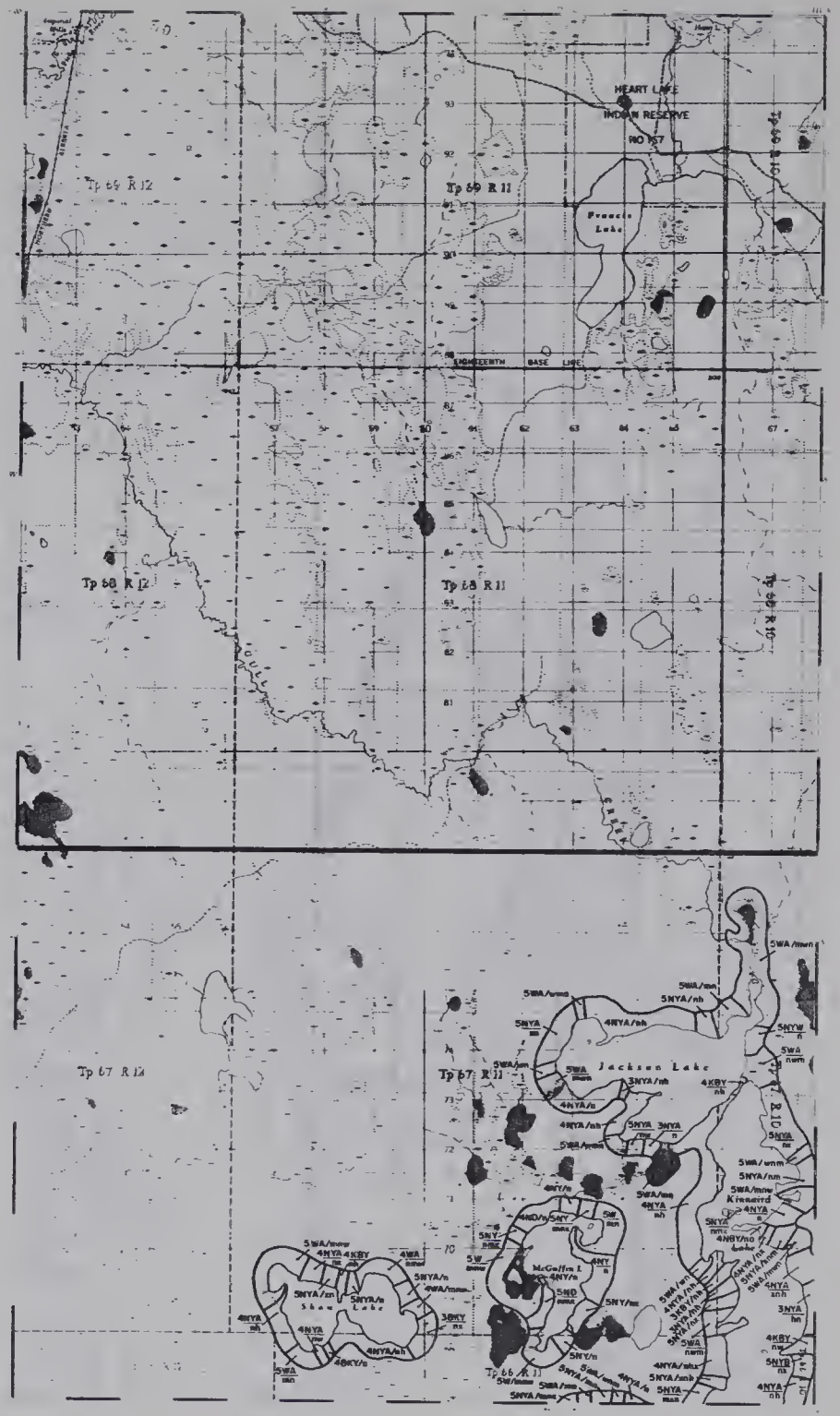

TP 69, R 17
TP 69, R 16
TP 69, R 15
TP 69, R 14
TP 68 R17
TP 68 R16
TP 68 14
TP 67, R 17
TP 67, R 16
TP 67, R 15
TP 67, R 14
TP 66 R17
TP 66, R 16
TP 66, R 15
TP 66, R 14
Lac
La
Biche
LAC
LA BICHE
SETTLEMENT
LAC LA BICHE
SETTLEMENT
Horse L
Sakoya L
Egg Lake
Antoine Lake
Missawawi Lake
Block Fox Island
Chapman
Piamondon
Brûlé
4WA mnw
4WA mnw
5WA nwm
5WNA nh
4NYV xnb
5WNA nx
1-BKY nz
5NYV bxh
4NYY/xbh
4BWY wvn
4NDV xbh
5NVD xbh
4NVY xbn
5WBN nw
4NYA hxn
4WAN nm
4NBW nm
4WA mnw
4VNY wbx
5NYA wnh
4VNY nbx
4NYA nxh
4NVY xbn
4NYA nxw
3NYA xn
5NVY axn
4NVY hxn
4NVY bxh
5NYV bwn
5WA wnm
1-BKY bnh
4VNY bnx
2-BKY/nwx
4NYA/nhx
5WA/nmw
4NYA nxh
4WNA nmw
4W mnw
4WA mnw
4WA mwn
3BKW nwh
5NYV nxh
4NYA nxh
4WBY nw
5NYV nxh
5NYA xnh
3BKY pxz
5NYA nxh
6Y zhn
4NYA nxb
4NVY zbh
3NBY bxh
1+BKY
4NVY xnh
4WA nmw
5NYA hxh
2+BKY nvx
6WA mnw
4NYA nhx
2-BKY n
5WA wnz
4NYA nh
5NYA nxh
2-BKY nxh
5NYA nxh
5WAN nmw
4NYA nh
4WA nwm
5NYA nwz
5NYA nxh
3BKY/nhz
LA BICH
4NYA/nhx
SETTLEME
3BKY/nwh
4NYA nxh
3NYB
4NYA/nhx
5NYA/nwz
5WAN/nmw
4NBA nh
3BKY nhx
4NBY nhx
4NYV wxb
5NYV wxh
4NYA nxh
4NYV nh
5NYV bzh
4NYV wx
5NYV xnh
5NYA hxh

Map 46



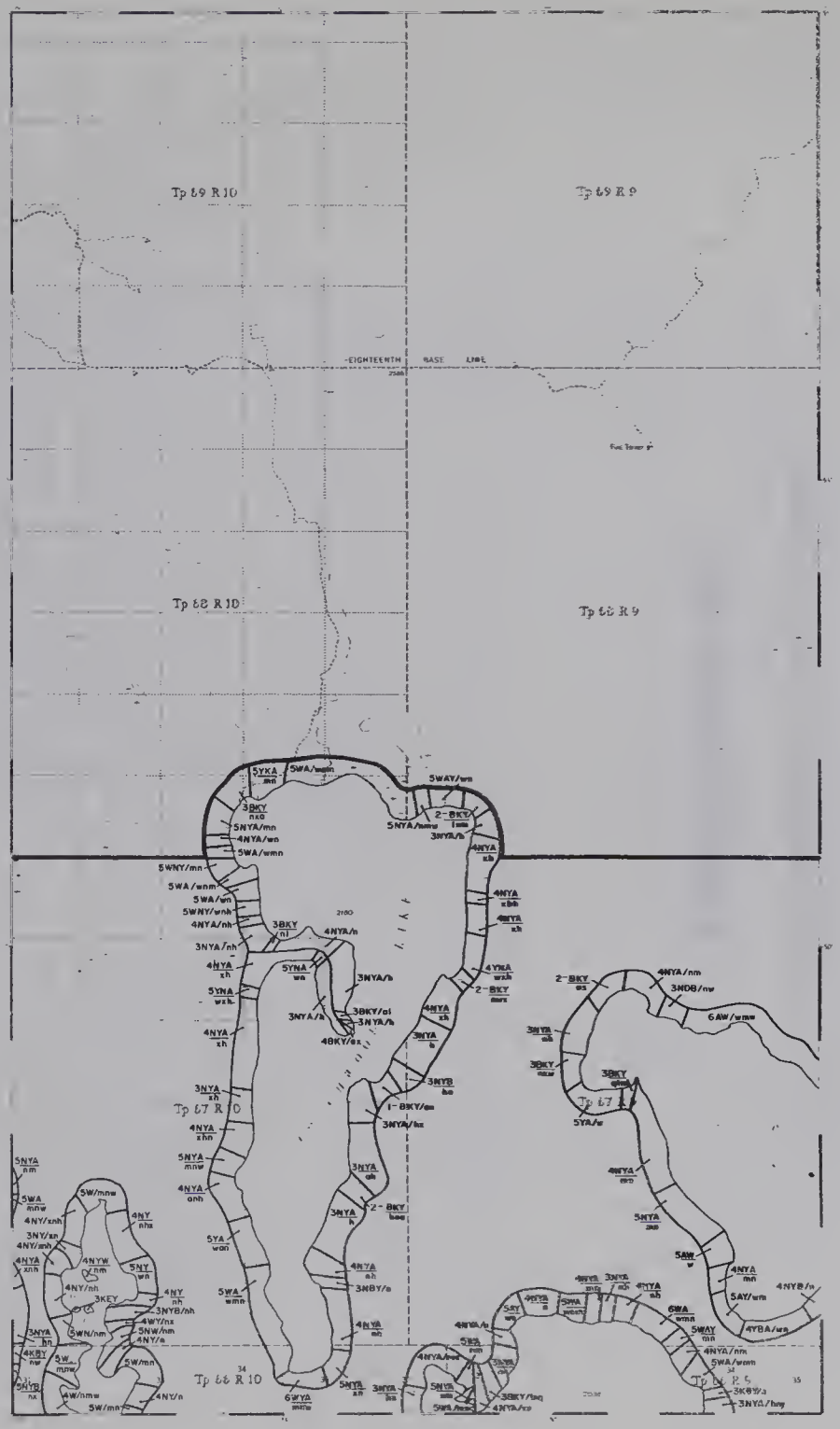

Tp 67 R 13
Tp 67 R 12
Tp 68 R 13
Tp 68 R 12
Tp 66 R 13
Tp 66 R 12
Square Lake
LAC LA BICHE
Beaver Lake
Tp 16 R 4

MAP 47

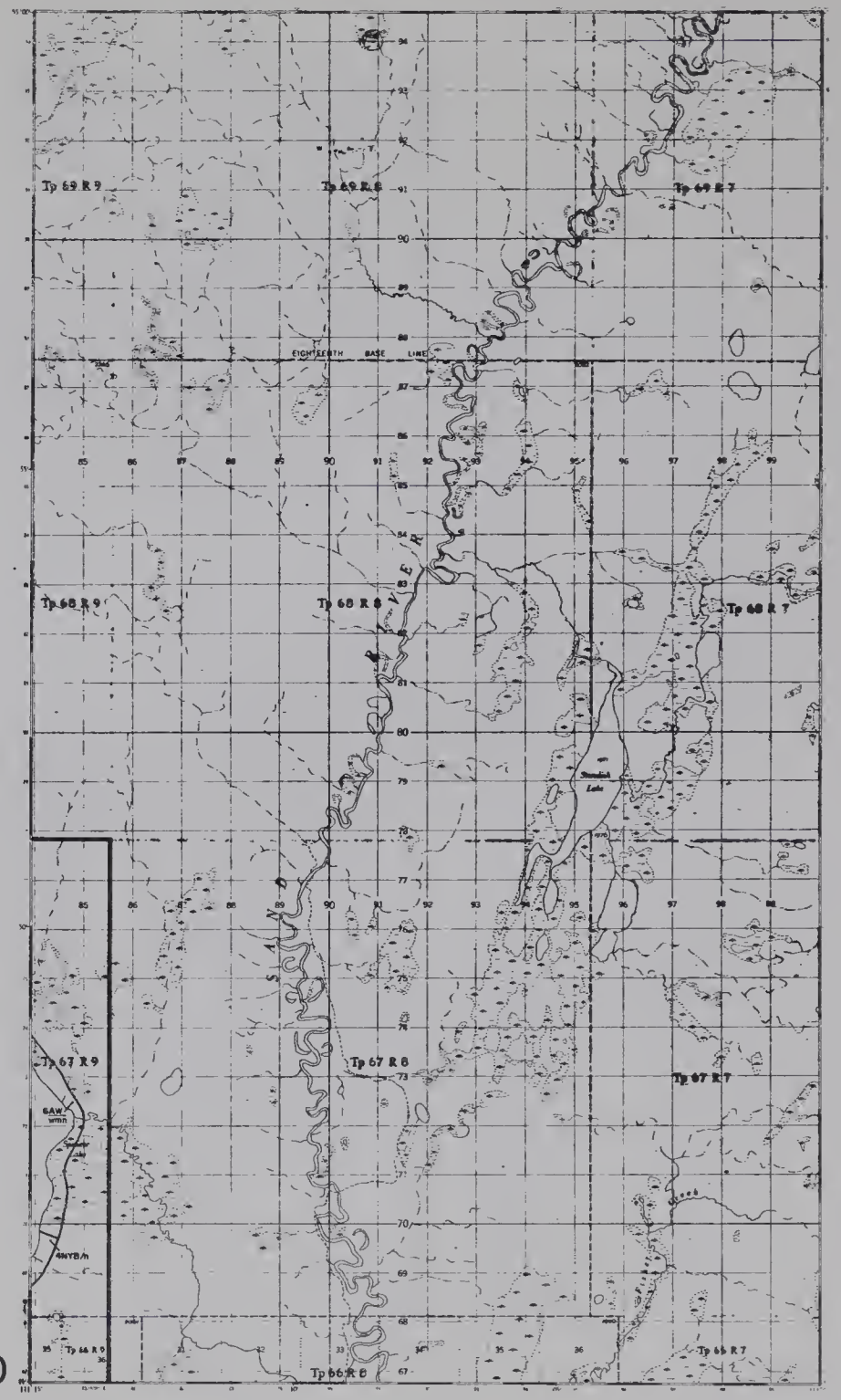

HEART LAKE INDIAN RESERVE NO 167
Tp 69 R 12
Tp 69 R 11
Tp 68 R 12
Tp 68 R 11
Tp 67 R 12
Tp 67 R 11
Tp 66 R 11
Francis Lake
Jackson Lake
Kreuzerd
McGillivray L
Tp 66 R 10

MAP 48




Tp 69 R 10
Tp 69 R 9
EIGHTEENTH BASE LINE
Tp 68 R 10
Tp 68 R 9
Tp 67 R 10
Tp 67
Tp 66 R 10
Tp 66 R 9

MAP 49


Tp 69 R 9
Tp 69 R 8
Tp 69 R 7
EIGHTEENTH BASE LINE
Tp 68 R 9
Tp 68 R 8
Tp 68 R 7
Tp 67 R 9
Tp 67 R 8
Tp 67 R 7
Tp 66 R 9
Tp 66 R 8
Tp 66 R 7

MAP 50



APPENDIX C

CAMPSITE AND SUMMER RESORT

USER QUESTIONNAIRE

CAMPSITE QUESTIONNAIRE - TYPE 1A

Ladies and gentlemen, please answer the following questions carefully. The information you give will contribute immeasurably towards the preparation of a report necessary for attaining a Master of Arts Degree at the University of Alberta. Furthermore, the report will also be used by the Provincial Parks Planning Staff to plan better parks and recreation for your pleasure and enjoyment. Your co-operation will be greatly appreciated.

Your signature is not required.

1. NAME OF LAKE OR CAMPSITE _____

2. DATE _____

3. YOUR PRESENT ADDRESS _____

HAVE YOU MOVED IN THE LAST FIVE YEARS? YES ____

NO _____

IF YES, PLEASE INDICATE YOUR PREVIOUS ADDRESS _____

_____

4. MAIN PURPOSE OF YOUR TRIP TO THIS LAKE.

BOATING _____ FISHING _____

CAMPING _____ ENJOY SCENERY ___

PICNICKING _____ BUSINESS _____

SWIMMING _____ OTHER (Specify) _____

5. HOW FAR ARE YOU WILLING TO DRIVE (Indicate distance one way) FOR THE PRIMARY REASON YOU CAME TO THIS LAKE FOR:

ONE DAY	A WEEKEND (2 or 3 days)	A PERIOD LONGER THAN A WEEKEND
25 miles (1/2 hr) ____	25 miles (1/2 hr) ____	25 miles (1/2 hr) ____
50 miles (1 hr) ____	50 miles (1 hr) ____	50 miles (1 hr) ____
75 miles (1-1/2 hr) ____	75 miles (1-1/2 hr) ____	75 miles (1-1/2 hr) ____
100 miles (2 hr) ____	100 miles (2 hr) ____	100 miles (2 hr) ____
150 miles (3 hr) ____	150 miles (3 hr) ____	150 miles (3 hr) ____
200 miles (4 hr) ____	200 miles (4 hr) ____	200 miles (4 hr) ____
		300 miles (6 hr) ____
Too short a period to travel for this primary reason ____	Too short a period to travel for this primary reason ____	Specify longer distance ____

6. CHECK ALL OF THE ACTIVITIES THAT YOU PLAN TO DO WHILE AT THIS LAKE.

SWIM	____	FISH	____	SIGHT-SEE	____	HIKE	____
GOLF	____	CAMP	____	PHOTOGRAPHY	____	OTHERS (Specify)	____
HUNT	____	PICNIC	____	WATER-SKI	____		
BOAT	____						

7. IF THERE WERE NO FISHING AVAILABLE IN THIS LAKE WOULD THE BOATING, SWIMMING, CAMPING AND PICNICKING OPPORTUNITIES ON THIS LAKE WARRANT YOUR COMING HERE?

NO ____ YES (Specify attraction or attractions)

_____

_____

8. DO YOU COME TO THIS LAKE IN ANY OTHER SEASON FOR OTHER RECREATIONAL ACTIVITIES?

NO ____ YES (Specify season and activities) ____

_____

9. HAVE YOU COME DIRECTLY TO THIS LAKE FOR FISHING, CAMPING, ETC., OR IS THIS JUST A STOP-OVER IN YOUR VACATION OR HOLIDAY TRIP?

DIRECTLY TO LAKE _____ STOP-OVER _____

10. ARE YOU HERE ON
A. VACATION _____
B. WEEKEND _____
C. DAY OFF _____
D. OTHER REASON (please specify)
_____

11. HOW LONG DO YOU EXPECT TO STAY AT THIS LAKE ON THIS TRIP?

_____ Hours
Days

12. ARE YOU
A. ALONE _____
B. WITH FAMILY _____
C. WITH A PARTY

13. IF WITH A FAMILY OR A PARTY OF PEOPLE, PLEASE INDICATE:

A. NUMBER OF LADIES _____
B. NUMBER OF MEN _____
C. NUMBER OF CHILDREN 12 YEARS OR YOUNGER _____
D. NUMBER OF CHILDREN OVER 12 YEARS OF AGE _____

14. IF YOU ARE ALONE, PLEASE INDICATE IF YOU BRING YOUR FAMILY TO THIS LAKE IN THE SUMMER,

A. OFTEN _____
B. OCCASIONALLY _____
C. NOT AT PRESENT BUT WOULD IF FACILITIES WERE IMPROVED
(Specify improvements) _____
_____

15. DO YOU COME TO THIS LAKE WITH YOUR FAMILY IN ANY OTHER SEASON OF THE YEAR?

YES _____ NO _____

IF YES, PLEASE SPECIFY SEASON AND ACTIVITIES _____

16. YOUR SEX _____

17. YOUR AGE _____ YEARS

18. YOUR OCCUPATION _____

19. WHAT TYPE OF ACCOMMODATION ARE YOU USING ON THIS TRIP?

TENT	_____	PRIVATE CABIN	_____
TRAILER	_____	RENTAL CABIN	_____
HOTEL	_____	PRIVATE HOME	_____
MOTEL	_____	OTHER (Specify)	_____
			_____

20. WHAT TYPE OF ACCOMMODATION DO YOU MOST PREFER TO USE ON A TRIP SUCH AS THIS?

TENT	_____	PRIVATE CABIN	_____
TRAILER	_____	RENTAL CABIN	_____
HOTEL	_____	PRIVATE HOME	_____
MOTEL	_____	OTHER (Specify)	_____
			_____

21. DO YOU A. OWN A BOAT YES _____ NO _____
B. RENT A BOAT YES _____ NO _____

22. PLEASE ESTIMATE THE ROUND TRIP DISTANCE FROM YOUR HOME TO THIS CAMPSITE AND RETURN, VIA THE SHORTEST ROUTE. MILES _____

23. HOW OFTEN DO YOU USE THIS LAKE

IN SUMMER		IN WINTER	
0 times	_____	0 times	_____
1 - 2 times	_____	1 - 2 times	_____
3 - 6 times	_____	3 - 6 times	_____
More than 6 times	_____	More than 6 times	_____

24. DO YOU USE OTHER LAKES IN THIS AREA FOR RECREATIONAL PURPOSES?

YES _____ NO _____

IF YES, PLEASE SPECIFY LAKES AND RECREATIONAL ACTIVITIES

_____

_____

25. DO YOU REGARD THE NATURAL QUALITIES (the beaches, water, scenery, etc.) OF THIS LAKE AS:

EXCELLENT ____ GOOD ____ FAIR ____ POOR ____

26. HOW LONG HAVE YOU BEEN COMING TO THIS LAKE FROM

A. YOUR PRESENT PLACE OF RESIDENCE _____ YEARS
B. YOUR PREVIOUS PLACE OF RESIDENCE _____ YEARS

27. DO YOU REGARD PRESENT BOAT LAUNCHING FACILITIES AS

ADEQUATE _____ INADEQUATE _____

Suggested Improvements _____

_____

28. DO YOU FEEL THAT MORE CAMPGROUNDS ARE NECESSARY IN THE SURROUNDING AREA OF THIS LAKE?

NO _____
YES (Please specify lakes, streams, or other sites where you would like to see a campground) _____

_____

29. WHEN YOU CAMP, DO YOU PREFER TO CAMP IN A

A. DEVELOPED AREA (Camp shelters, toilets, well, towns near-by, access to the site very easy)?
YES _____ NO _____

B. WILDERNESS OR REMOTE AREA (just the bare minimum in campground facilities, distant from settlement, access more difficult)? YES _____ NO _____

30. WHAT IS YOUR OPINION REGARDING

A. THE QUALITY OF THIS CAMPGROUND

EXCELLENT _____ GOOD _____ FAIR _____ POOR _____

i. THE QUALITY OF TOILET FACILITIES

EXCELLENT _____ GOOD _____ FAIR _____ POOR _____

ii. THE QUALITY OF WATER SUPPLIES FOR DRINKING

EXCELLENT _____ GOOD _____ FAIR _____ POOR _____

iii. THE QUALITY OF THE FIREPLACES OR PEDESTAL STOVES

EXCELLENT _____ GOOD _____ FAIR _____ POOR _____

iv. THE QUALITY OF THE KITCHENS, TABLES, SHELTERS

EXCELLENT _____ GOOD _____ FAIR _____ POOR _____

v. THE QUALITY OF THE PLAYGROUND FACILITIES FOR CHILDREN

EXCELLENT _____ GOOD _____ FAIR _____ POOR _____

vi. SUGGESTED IMPROVEMENTS TO ANY OF THE ABOVE OR OTHER FACILITIES

_____

_____

31. DO YOU OWN A CABIN ON ANY LAKE IN ALBERTA?

YES _____ NO _____ IF YES, PLEASE SPECIFY LAKE _____

32. WHICH FACTOR(S) IN THIS AREA DO YOU FEEL CONTRIBUTES THE MOST TO MAKING YOUR TRIP SUCCESSFUL?

_____

_____

33. WHICH FACTOR(S) IN THIS AREA DO YOU FEEL CONTRIBUTES THE MOST TO NOT MAKING YOUR TRIP THE MOST ENJOYABLE? _____

34. INCOME RANGE OF FAMILY:

A. $ 2,500 or less _____

B. $ 2,501 to $ 5,000 _____

C. $ 5,001 to $7,500 _____

D. $ 7,501 to $10,000 _____

E. MORE THAN $10,000 _____

35. DURING THE PAST 24 HOURS I HAVE SPENT THE FOLLOWING MONEY IN THE AREA WITHIN APPROXIMATELY 15 - 20 MILES OF THIS LAKE.

A. ACCOMMODATION (cabin hotel, motel, etc.) _____

B. MEALS OR SNACKS AT A DRIVE-IN, CAFE, ETC. _____

C. GROCERIES AND MEATS

D. CLOTHING _____

E. ENTERTAINMENT, SHOWS, ETC. _____

F. LIQUOR _____

G. SUNDRY ITEMS (cigarettes, magazines, toys, candy pop, etc.) _____

H. MEDICINE _____

I. AUTOMOBILE - GAS AND OIL _____
- OTHER (include repairs) _____

J. BOAT-GAS AND OIL _____
- OTHER (include repairs) _____

K. BOAT RENTAL OR LAUNCHING FEES _____

L. FISHING TACKLE (include lures, rods, etc.) _____

M. CAMPING EQUIPMENT (fuel stoves, coolers, etc.) _____

N. BAIT OR FREEZING SERVICES, ICE _____

O. ACCESSORIES (cameras, films, etc.) _____

P. MAJOR NEW PURCHASES (boat motor, boats, trailers, guns, cars, etc.) _____

Q. MISCELLANEOUS (any expenditure not previously included)

_____

36. WHAT ROUTE DID YOU TAKE ON THIS TRIP TO REACH THIS CAMPSITE? _____

_____

_____

37. WHAT IS YOUR OPINION OF THE CONDITION OF THE ABOVE ROADS YOU USED IN REACHING THE CAMPSITE? RATE EACH ROAD UNDER: EXCELLENT, GOOD, FAIR, POOR.

_____

_____

38. DO YOU FEEL THAT ROADS (gravelled) IN THE SURROUNDING AREA OF THIS LAKE REQUIRE IMPROVEMENT?

YES _____ NO _____

39. THE SPACE ON THE REVERSE SIDE OF THIS SHEET IS PROVIDED FOR ANY ADDITIONAL COMMENTS OR SUGGESTIONS WHICH COULD ASSIST THE PLANNING OF BETTER FACILITIES IN ALBERTA PROVINCIAL PARKS AND CAMPSITES. ANY COMMENTS CONCERNING THE QUESTIONNAIRE WOULD ALSO BE APPRECIATED.

Thank you very much for taking the time to answer this questionnaire and may you have an enjoyable stay at this campsite and area of Alberta'.

JULIAN J. NOWICKI, Graduate Student
Department of Geography,
University of Alberta, Edmonton, Alberta

APPENDIX D

COVER LETTER AND COTTAGE QUESTIONNAIRE

DEPARTMENT OF GEOGRAPHY

THE UNIVERSITY OF ALBERTA
EDMONTON, CANADA

November 24, 1967

Dear Sir or Madam:

I am a graduate student in Geography at the University of Alberta, Edmonton. I am undertaking field research in recreation for a Master of Arts degree. My research is an analysis of the outdoor recreational potential of Northeastern Alberta. The research project will be written up in report form (i.e., thesis) for the University of Alberta. Also, a copy of the thesis will go to the Alberta Provincial Parks Planning Staff.

One part of my thesis will deal with the present recreational users in this region. By the questionnaire it is hoped to establish the opinions of the cottagers (cabin owners). Would you please fill out the enclosed questionnaire. Your cooperation will be greatly appreciated since almost everyone to whom questionnaires have been sent must answer in order that valid statements can be made. Should you wish your information to be regarded as confidential I can assure you that it will be considered as such.

Please return the completed questionnaire by December 15, 1967 in the enclosed self-addressed and stamped envelope.

Thank you very much for your patience and cooperation.

COTTAGE (CABIN) QUESTIONNAIRE No._____

PLEASE RETURN BY DECEMBER 15, 1967

Office Use Only

Wherever a choice is given, please check (✓) the appropriate answer in this column

1.) Name of lake where your cottage is located? _____		
2.) Is this cottage a permanent place of residence?	2	
1.) No		1
2.) Yes		2
If yes, then please do not proceed any further on the questionnaire.		
3.) Is the lot on which your cottage is located	3	
1.) Owned by yourself		1
2.) Leased from another property owner		2
3.) Leased from the Government		3
4.) Age of cottage:	4	
1.) 0 - 3 years		1
2.) 4 - 6 years		2
3.) 7 - 9 years		3
4.) 10 - 14 years		4
5.) 15 - 20 years		5
6.) 21 - 30 years		6
7.) 31 + years		7
5.) How long have you owned your cottage?	5	
1.) 0 - 3 years		1
2.) 4 - 6 years		2
3.) 7 - 9 years		3
4.) 10 - 14 years		4
5.) 15 - 20 years		5
6.) 21- 30 years		6
7.) 31+ years		7
6.) Do you lease your cottage to someone else during the year?	6	
1.) 1.) No		1.1.
2.) Yes		1.2.
2.) If yes, please specify when, and the lessee's address _____ _____		
7.) Home address of cottage owner. _____		
8.) Has your permanent address, as listed above, changed in the last five years?	8	
1.) 1.) No		1.1.
2.) Yes		1.2.
2.) If yes, please specify previous addresses. _____ _____		

Please check (√) answer here

Office Use Only

9.) Cottage owner's age _____years

10.) Cottage owner's occupation _____

11.) Cottage owner's sex — 11
- 1.) Male ---------- 1
- 2.) Female ---------- 2

12.) Why did you select the particular lake on which your cottage is located as a place to purchase or build your cottage? When answering this question and questions 13, 14 and 15, rather than checking the appropriate answers, use numbers to indicate priority (i.e., use "1" for the most important reason, "2" for the second most important, etc.). — 12
- 1.) Natural beauty of lake ---------- 1
- 2.) Fishing ---------- 2
- 3.) Convenience (close to home) ---------- 3
- 4.) Close to an excellent transportation route (e.g., major highway) 4
- 5.) Good water quality ---------- 5
- 6.) Size of lake ---------- 6
- 7.) Other reason(s). Please specify _____

_____

13.) Why did you select the particular site on the lake for your cottage? Please use numbers to indicate priority. — 13
- 1.) Only site available on lake ---------- 1
- 2.) View ---------- 2
- 3.) Good vegetative cover (e.g., 20+' high, providing shade) ---- 3
- 4.) Proper soil materials for foundations and sewage disposal ----- 4
- 5.) Well-drained backshore ---------- 5
- 6.) Fresh water availability ---------- 6
- 7.) Vehicle access is not difficult in summer (i.e., May to October) 7
- 8.) Vehicle access is not difficult in winter (i.e., November to April) ---------- 8
- 9.) Exposure to sun ---------- 9
- 10.) Sheltered from wind ---------- 10
- 11.) Ease of access to water, from shore (e.g., 7% - 15% slopes) --- 11
- 12.) Sandy beach ---------- 12
- 13.) Cobble (rounded 4 inches-in-diameter rocks) beach -------- 13
- 14.) Steep offshore gradient (i.e., 15%+) suitable for beaching boats and construction of short docks ---------- 14
- 15.) Offshore gradient (i.e., 1% - 5%) suitable for bathing ------ 15
- 16.) No weeds offshore ---------- 16
- 17.) Firm offshore bottom ---------- 17
- 18.) Other reason(s). Please specify _____

_____

_____

_____

Please check (✓) answers here

Office Use Only

14.) Do you now find any problems with the lake on which you are located? Please use numbers to indicate priority.

		14
1.)	Severe algae bloom	1
2.)	Too weedy	2
3.)	Lake gets too rough for family boating	3
4.)	No fish	4
5.)	Lake is too intensively used for its size	5
6.)	Other problem (s). Please specify_____	

15.) Do you now find any problems with the particular site where your cottage is? Please use numbers to indicate priority.

		15
1.)	Unstable soil materials	1
2.)	Poor or no vegetative shade cover	2
3.)	Present lot is too small (i.e., need more space)	3
4.)	Backshore not well-drained	4
5.)	Vehicle access is difficult in summer (i.e. May to October)	5
6.)	Vehicle access is difficult in winter (i.e. November to April)	6
7.)	Traffic noise	7
8.)	Poor view	8
9.)	No fresh water available	9
10.)	Site too exposed to wind	10
11.)	Serious insect infestation	11
12.)	Access to water from shore difficult	12
13.)	Foreshore too rocky	13
14.)	Offshore too weedy	14
15.)	Mucky and soft offshore bottom	15
16.)	Offshore gradient too shallow (i.e., 1% - 5%)	16
17.)	Offshore gradient too steep (i.e., 15%+)	17
18.)	Other problem(s). Please specify_____	

16.) Do you have a family?

		16
1.)	1.) No	1.1
	2.) Yes	1.2

2.) If yes, please specify below.

Age Group	No. of Males	No. of Females
12 years or younger		
13 - 19 years		
20 - 44 years		
45 - 64 years		
65 or over		

17.) How often do you use your cottage. Please answer on the next page.

Please check (✓) answer here

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In Summer (i.e., May to October)

All summer →		No. of weeks ____
A few weeks only →		No. of weeks ____
Weekends only →		No. of weeks ____
1-2 days each week →		No. of weeks ____
Less than 1 day each week →		No. of weeks ____
Not at all →		

In winter (.i.e., November to April)

All winter →		No. of weeks ____
A few weeks only →		No. of weeks ____
Weekends only →		No. of weeks ____
1-2 days each week →		No. of weeks ____
Less than 1 day each week →		No. of weeks ____
Not at all →		

18.) Check all of the recreational activities that you or your family do while at the cottage.

	18	
1.) Swim		1
2.) Golf		2
3.) Hunt		3
4.) Fish		4
5.) Camp		5
6.) Boat		6
7.) Water-ski		7
8.) Scuba dive		8
9.) Hike		9
10.) Photography		10
11.) Sight-see		11
12.) Picnic		12
13.) Other (s). Please specify _____		

19.) If not all of the above activities are done on the lake on which your cottage is located then please specify below where you go to satisfy the activity.

Area (e.g., lakes, etc.)	Reason

20.) The above activities are predominantly summer activities. Do you and your family use your cottage in any other season for other recreational activities (e.g., power-tobogganing, hunting, ice fishing, etc.)?

	20	
1.) No		1.1
2.) Yes		1.2

2.) If yes, please specify season and recreational activities

_____

Please check (✓) answer here

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21.) If there were no fishing available in your lake would the boating, swimming and other recreational assets of the lake warrant your owning a cottage on it? 21

1.) 1.) No ---------- 1.1

2.) Yes ---------- 1.2

2.) If yes, please specify attraction(s) that would bring you to the lake

_____

_____

_____

22.) Do you own a cottage(s) on any other lake(s) in Alberta? 22

1.) 1.) No ---------- 1.1

2.) Yes ---------- 1.2

2.) If yes, please specify lake(s) _____

_____

23.) Do you: (Please check more than one answer if necessary) 23

1.) Own a boat ---------- 1

2.) Rent a boat when at the cottage ---------- 2

3.) Use a friend's or relation's boat when at the cottage ---------- 3

24.) Do you regard the natural qualities (i.e., beaches, water, scenery, etc.) of your cottage site as (please check only one): 24

1.) Excellent ---------- 1

2.) Good ---------- 2

3.) Fair ---------- 3

4.) Poor ---------- 4

25.) Type of transportation used to reach your cottage from place of residence 25

1.) Car ---------- 1

2.) Truck ---------- 2

3.) Bus ---------- 3

4.) Train ---------- 4

5.) Plane ---------- 5

6.) Other(s). Please specify _____

26.) What road(s) do you use in reaching your cottage? Describe by giving number of highway and (or) towns passed through or by.

_____

_____

_____

_____

27.) What is your opinion of the driving conditions on the above roads. Rate each road under - excellent, good, fair, poor.

_____

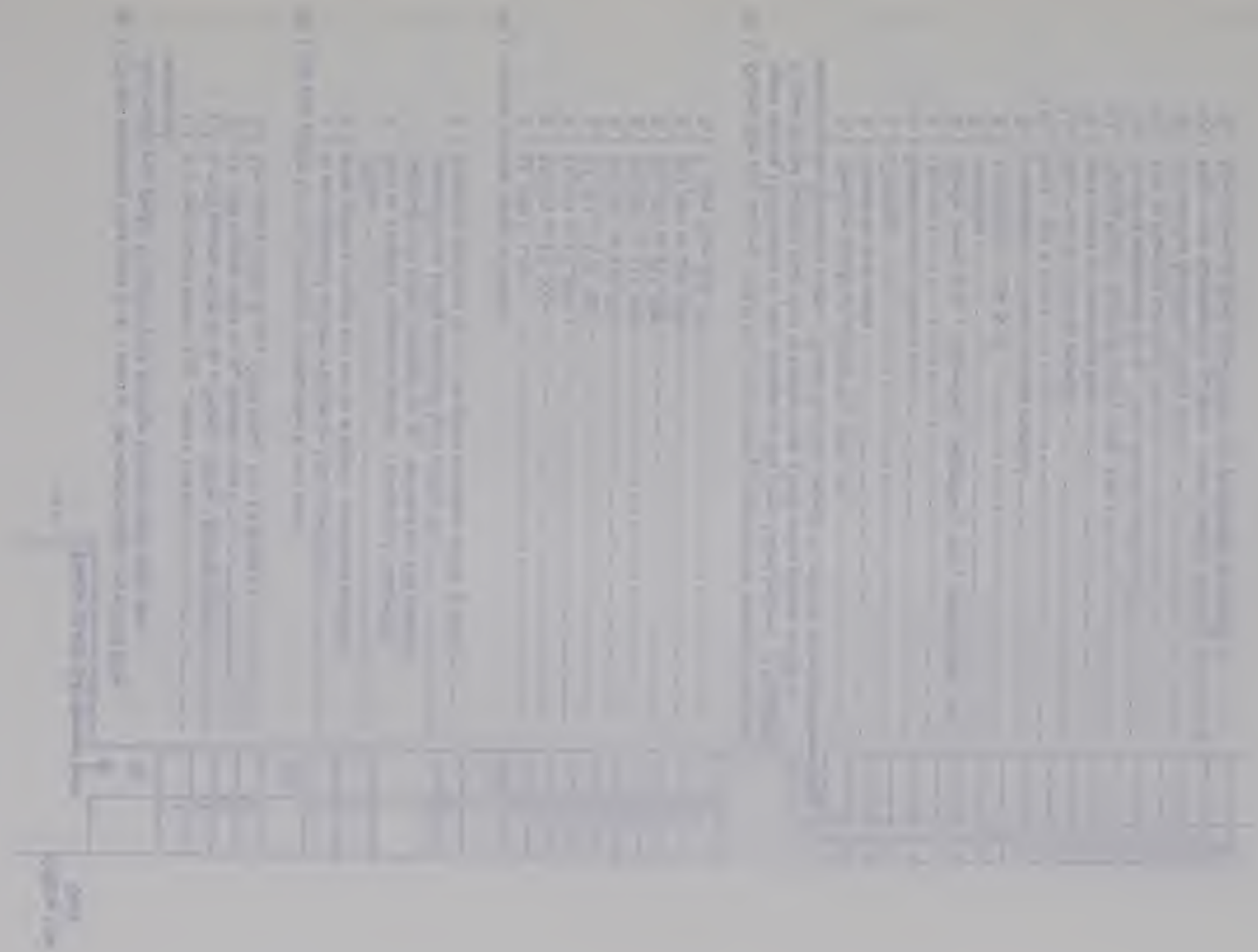
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_____

_____

_____

	Please check (✓) answer here	Office Use Only
28.) Of the following lake sizes (i.e., area of the water-body) on which lake size would you prefer to locate your cottage (please make only one selection).	28	
1.) 5 or less square miles (e.g., Moore Lake)		1
2.) 6 - 20 square miles (e.g., Moose, Marie, Beaver Lakes)		2
3.) 21 - 50 square miles (e.g., Muriel Lake)		3
4.) 51+ square miles (e.g., Cold Lake, Lac La Biche)		4
29.) Do you prefer to own a cottage (please check only one)	29	
1.) In an organized summer village or lake association		1
2.) Near other cottages but not in a tightly organized summer village		2
3.) Not in a tightly organized summer village and reasonably isolated from other cottages (e.g., isolated by 100 yards of vegetation or being separated by a point, etc.)		3
4.) Remotely secluded (e.g., no other cottages within $\frac{1}{2}$ mile)		4
30.) Annual income range of family:	30	
1.) $2,500 or less		1
2.) $2,501 to $5,000		2
3.) $5,001 to $7,500		3
4.) $7,501 to $10,000		4
5.) $10,001 to $12,500		5
6.) $12,501 to $15,000		6
7.) $15,001 to $17,500		7
8.) $17,501 to $20,000		8
9.) $ More than $20,000		9
31.) During the past summer (1967) how much money (approximate amount) have you spent within 15-20 miles of your cottage on the items listed below. If shopping is done in the nearest town that is further than 15-20 miles please use it in answering the following items. Please indicate amount in column →		
1.) Meals or snacks at a drive-in, cafe, etc.		1
2.) Groceries and meats		2
3.) Clothing		3
4.) Entertainment, shows, etc.		4
5.) Liquor		5
6.) Sundry items (e.g., cigarettes, magazines, toys, candy, pop, etc.)		6
7.) Medicine		7
8.) Automobile - gas & oil		8
9.) Automobile - Other (include repairs)		9
10.) Boat - gas & oil		10
11.) Boat - other (include repairs)		11
12.) Boat rental or launching fees		12
13.) Fishing tackle (include lures, rods, etc.)		13
14.) Camping equipment (e.g., fuel, stoves, coolers, etc.)		14
15.) Bait or freezing services, ice.		15
16.) Accessories (cameras, films, etc.)		16
17.) Major new purchases (e.g., boat motor, boats, trailers, guns, cars)		17
18.) Miscellaneous (any expenditure not previously included)		18



Please check (✓) answer here

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32.) How long does it take to reach your cottage? Please specify below to the nearest half hour (e.g., 1 hour, 1½ hours, 5 hours).

_____

33.) How far would you be willing to drive (one way) to a cottage located on a site with a high recreational potential (i.e., small beach for bathing and swimming, good vegetative cover, clean water, no weeds off shore, good access to water, etc.)?

	33
1.) 25 miles (½ hour)	1
2.) 50 miles (1 hour)	2
3.) 75 miles (1½ hours)	3
4.) 100 miles (2 hours)	4
5.) 150 miles (3 hours)	5
6.) 200 miles (4 hours)	6
7.) 250 miles (5 hours)	7
8.) 300 miles (6 hours)	8
9.) 350 miles (7 hours)	9
10.) 400 miles (8 hours)	10
11.) Please specify longer distances or time.	

_____

34.) Please use the reverse side of this sheet for any additional comments or suggestions which could assist the planning of better facilities and sites in Alberta Provincial Parks and elsewhere for cottagers. Any comments concerning the questionnaire would also be appreciated.

Upon completion of the questionnaire please enclose the questionnaire in the provided self-addressed and stamped envelope and post before December 15, 1967

Thank you very much for taking the time to answer this questionnaire.

Julian J. Nowicki,
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B29925